

ATTACHMENT 3

RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

ATTACHMENT 3

RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

Radiological control protocols will be implemented to support the planned survey activities. These protocols are intended to protect the health and safety of workers and the general public, comply with the Tetra Tech EC, Inc. (TtEC) radiological control procedures and to minimize the liability of TtEC and the Department of the Navy (DON) for risks associated with radioactive materials.

1. Air Sampling Program

Ambient air monitoring shall be performed in areas with the potential to exceed 10 percent of the derived air concentration (DAC) for radium-226. Ambient air monitoring may be performed using portable air samplers or air monitoring systems. Ambient air monitoring shall be placed in strategic locations to detect and evaluate airborne contamination at work locations. Data obtained from air monitoring shall be used for assessing the control of airborne radioactivity in the workplace and may be used to evaluate the dose equivalent to radiation workers from internal sources.

Air monitoring will be conducted following standard industrial hygiene methods and analyzed following standard Occupational Safety and Health Administration (OSHA)/National Institute for Occupational Safety and Standards for Health (NIOSH) procedures. A known amount of air is collected in the "breathing zone" on an air filter in an "open face" cassette. Air filters will be collected daily and counted on the low-background scaler. Air filters that are assigned a net count rate above the background count rate for alpha radiation will be segregated and recounted after 72 hours (3 days). The 72-hour recount is to determine if the activity recorded was from radon daughters or from uranium.

If personnel air sampling, after correcting for radon daughters, indicates a potential radium intake greater than 0.02 annual limit of intake (ALI), a spot urine sample will be collected from the worker and sent off site for analysis to confirm the intake.

If personnel air sampling, after correcting for radon daughters, indicates a potential uranium intake greater than 0.1 ALI, a daily urine sample will be collected from the worker and sent off site for uranium analysis until a pattern of bodily retention and excretion can be established.

2. Respiratory Protection Program (If Required)

Given the conditions at IR Sites 1, 2 and 32 and the planned work activities to be performed, respiratory protection is not expected to be required. If it is determined that respiratory protection

is needed, then the respiratory program discussed in Section 6.1 of the Site-specific Health and Safety Plan will be followed.

3. External Exposure Determination (If Required)

Dose rates at IR Sites 1, 2 and 32 are expected to be below the Nuclear Regulatory Commission (NRC) unrestricted area dose rate of 0.002 rem per hour. Since the site dose rate is below 0.002 rem per hour, it is not likely that workers will receive a dose in excess of 0.1 rem. Therefore, occupational exposure monitoring is not required in accordance with 10 Code of Federal Regulations (CFR) 20.1502. Dose rates at IR Sites 1, 2 and 32 will be periodically collected during the survey to verify that personnel exposure monitoring is not required.

4. Internal Exposure Determination (If Required)

Given the conditions at IR Sites 1, 2 and 32, it is not expected that workers will receive an internal exposure greater than 10 percent of an ALI. Therefore, internal dosimetry evaluations will not be performed.

Internal dosimetry investigations will be performed with possible follow-up bioassay sampling when:

- Face or nasal contamination occurs
- Air sampling indicates that a worker(s) may have been exposed
- Other reasons as determined by the Project Health Physicist (PHP)

An internal dosimetry investigation will include the following actions taken by internal dosimetry:

- A preliminary internal dose estimate based on air sampling and/or bioassay results
- An interview with the worker, their supervisor, and/or involved PHP to determine radiological working conditions and potential time of intake
- Issuance of a radiological work restriction if preliminary dose estimates are greater than or equal to 100 millirem committed effective dose equivalent (CEDE), to limit any further exposure that may prevent obtaining valid follow-up bioassay sampling and interfere with the dose evaluation
- Follow-up bioassay sampling (in-vitro and/or in-vivo) to confirm initial results
- Notification of the worker and supervisor after follow-up sampling is completed and the final dose estimate is completed

The radiation dose equivalent incurred from internally deposited radionuclides will be estimated using widely accepted methods. Currently, bioassay methods accepted by the NRC and

Department of Energy (DOE) are those proposed by the International Commission on Radiological Protection (ICRP) Publication 30. At a minimum, such assessments will include:

- Chemical and physical form of the radionuclides
- Bioassay results and previous exposure history
- Route of intake and time and duration of exposure
- Biological models used for dosimetry
- Models to estimate intake or deposition and to assess dose
- Any recommended medical intervention

5. Summation of Internal and External Exposures

Based on the conditions at IR Sites 1, 2 and 32, it is not expected that workers will receive recordable exposures from either internal or external sources of radiation. However, if workers do receive a recordable exposure, the requirements of 10 CFR 20.1202 will be followed to comply with the requirements for summation of external and internal doses received.

6. Contamination Control Program

Radiological control procedures will be implemented during the radiological survey activities at IR Sites 1, 2 and 32. These practices will be conducted in accordance with TtEC corporate radiological protection procedures and are intended to protect the health and safety of workers and the general public.

6.1. Personnel Exposure Monitoring

Dose rates at IR Sites 1, 2 and 32 are expected to be below the NRC unrestricted area dose rate of 0.002 rem per hour. Since the site dose rate is below 0.002 rem per hour, it is not likely that workers will receive a dose in excess of 0.5 rem. Therefore, occupational exposure monitoring is not required in accordance with 10 CFR 20.1502. Dose rates at IR Sites 1, 2 and 3 will be periodically collected during the survey to verify that personnel exposure monitoring is not required.

6.2. Periodic Monitoring

The PHP or his designee will perform periodic contamination and dose rate surveys during work activities to ensure that project personnel are aware of any changes to the site radiological conditions.

6.3. Investigation-derived Waste

All solid waste generated within the controlled area of IR Sites 1, 2 and 32 will be managed as low-level radioactive waste. Solid waste generated will be placed into a Department of Transportation (DOT)-approved container and staged for shipment to an approved low-level waste processor or disposal site. Solid waste that can be surveyed for unconditional release will be surveyed, and if acceptable, will be released as non-radioactive solid waste.

Wastewater, generated from equipment and personnel decontamination, will be collected in 55-gallon drums and labeled as "Non-hazardous Decontamination Water." The drums will be temporarily staged within a pre-designated and secondarily contained on-site waste accumulation area pending characterization and appropriate disposal.

6.4. Personnel Survey Procedure

Personnel exiting the controlled area of IR Sites 1, 2 and 32 will undergo a personnel survey prior to exiting the controlled area if, during the field activities, elevated radiological readings were observed. If a worker finds contamination while surveying out of the controlled area, they are to stop and notify the PHP or designee. The potentially contaminated worker will stay at the controlled area entrance to minimize potentially spreading contamination. The PHP or designee will assist the worker in decontaminating the affected areas using standard decontamination techniques. A stop work order will be issued while the potential causes are evaluated and the DON (Radiological Affairs Support Office) is notified of the personnel contamination.

Personnel survey will be performed in accordance with Appendix D-7, Radiological Protective Clothing Selection, Monitoring, and Decontamination, of the Radiological Survey Work Plan.

6.5. Sampling

Soil samples will be collected at biased locations after the surface scan survey is complete. Soil sampling activities will be carefully controlled, with personnel collecting the sample, at a minimum, wearing gloves. Samples will be surveyed before they are removed from the area to ensure that the radiation levels of the sample are acceptable to permit release. Sampling will be performed in accordance with Appendix D-4, Sampling Procedures for Radiological Surveys, of the Radiological Survey Work Plan.

6.6. Equipment and Material Release

A radiological release survey will be performed on equipment used inside the IR Sites 1, 2 and 32 controlled area during the radiological survey to verify that radiological release limits are not exceeded. Equipment and release surveys will be performed in accordance with Appendix D-5, Release of Materials and Equipment from Radiologically Controlled Areas, of the Radiological Survey Work Plan.

7. Instrumentation Program

Both portable and fixed radiation monitoring equipment will be used to monitor the radiological conditions at the site during work activities. All radiation monitoring equipment used will be calibrated annually in accordance with nationally recognized calibration methods.

Daily monitoring equipment operational checks will be performed prior to first use of the equipment in accordance with Appendix D-7, Preparation of Portable Radiation and Contamination Survey Meters and Instruments for Field Use, of the Radiological Survey Work Plan. The daily operational checks will include visual inspection for damage and confirmation current calibration by inspecting the attached calibration sticker, battery check, and response check.

ATTACHMENT 4
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS (AHA) # 1**Trailer Installation at Alameda Point**

Created by: Jennifer Amdursky

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to implement safe procedures for trailer installation.		
1. Identify driver requirements prior to trailer delivery.	Lack of tractor/trailer inspection could lead to citations or tickets.	Ensure that driver has a current commercial driver's license.
2. Locate utility lines.	Contact with above and below ground utilities could cause property damage or injury.	Make sure all above and below ground utilities have been identified.
3. Oversee truck arriving at selected site.	Location could be unstable or unable to appropriately support the trailer.	Locate trailer on a surface that is stable.
4. Oversee truck positioning trailer into selected area.	Truck or trailer could hit someone or something.	Use spotters when positioning trailer. Ensure that spotters know how to communicate with driver of truck.
5. Make sure truck is secured.	Truck and trailer could roll.	Set parking brake and chock wheels to prevent truck and trailer from rolling.
6. Unhook trailer.	Improper placement could cause trailer jack to fail.	Ensure that trailer jack is working properly and is placed on stable ground or cribbing.
	Trailer could fall off hitch.	Ensure that nonessential personnel stay clear of operation.
7. Level trailer.	Back injuries, trip hazards, and falls could result from leveling trailer.	Use correct lifting techniques and be aware of potential hazards.
8. Secure trailer.	Contact with above and below ground utilities could cause property damage and injury.	Make sure that all above and below ground utilities have been identified.
9. Install anchors.	High winds could tip over trailer.	Ensure that trailer is anchored according to recommended procedures.
	Noise and sharp edges could result from installing anchors.	Ensure that hearing and hand protection are worn when installing anchor straps.
10. Install stairs.	Door clearances may not line up properly keeping door from opening/closing or may present trip hazards.	Ensure that swing radius of door and stair platform; maintain a 21-inch clearance.
	Doors could blow open during high winds and strike on-site personnel.	Ensure that doors are equipped by a restraint system.
	Failure to comply with OSHA could result in injury or property damage.	Ensure that stairs, hand rails, mid rails and platform meet OSHA standards.
11. Secure stairs.	Unstable stairs could cause trip or fall hazards.	Ensure that stairs are anchored to the trailer or ground.
12. Run cables for electrical hookup of trailer.	Cables could cause trip hazards.	Carefully unroll cables. Place cables in holders and mark any trip hazards.
	Cables could be energized.	Ensure that cables are not connected to live sources.
13. Connect electrical hookup to trailer.	Contact with energized source could cause electrocution.	If possible, de-energize the source connection so that wiring can be performed safely.
	Cables could be energized.	Ensure that cables are not connected to live sources.
14. Install generator – inspect generator upon delivery.	Defective generator could cause injuries or electrocution.	Ensure that there is an operator's manual. Follow the manual regarding inspection procedure.

ACTIVITY HAZARD ANALYSIS (AHA) # 1

Trailer Installation at Alameda Point

Created by: Jennifer Amdursky

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
15. Set up generator.	Generator could move if it is not on stable ground or wheels are not chocked.	Position unit using spotters. Place wheel chocks under wheels so that generator cannot move when it is position.
	Workers could be hit by unit as it is placed into position.	When jack is dropped to raise the generator off the trailer hitch, ensure that hands are away from pinch points and that feet are positioned away.
	Workers could be injured by jack, especially if jack is placed in soft soil.	Use cribbing to provide a solid stable surface if necessary.
	Failure to ground generator could cause workers to be electrocuted.	Ensure that unit is internally grounded per National Electrical Code or that unit is grounded using the approved grounding rod and that the rod is installed per the National Electrical Code.
16. Connect lines to generator.	Connection while the lines are energized or the generator is on could cause electrocution of workers.	Turn off generator before installing lines. No live electrical work is permitted at any time during installation of power to the trailer.
17. Power up generator.	Failure to follow manufacturer's directions could damage the generator or cause electrocution.	Follow manufacturer's directions.
	Excessive noise could result from the operation of the generator motor.	Wear hearing protection in vicinity of generator.
18. Refuel generator.	Improper refueling could cause fires.	Refuel only when the unit is off and the engine is slightly cool.
	Fuel could spill and cause environmental damage or worker exposure.	Refuel only in a designated area and have spill control materials available. Workers should wear PPE.

Notes:

AHA – Activity Hazard Analysis

CIH – Certified Industrial Hygienist

OSHA – Occupational Safety and Health Administration

PPE – personal protective equipment

ACTIVITY HAZARD ANALYSIS (AHA) #2

Clearing and Grubbing for Alameda Point

Created by: Cliff Stephan, CHP

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to remove and or clear any trees, shrubs, bushes etc., at Alameda Point. Clearing and grubbing may involve the following pieces of equipment: chipper/shredders, brush hog, mowers, chain saw, weed cutters, axes, and backhoes.		
1. Inspect work area.	Failure to inspect work area may result in trips and falls from the same level.	Ensure that work area is free from potential trip hazards and that only a minimum of authorized personnel are permitted in the work zone.
	Local vehicle traffic could strike and injure surveyors and field crew.	Ensure that all individuals participating in the field activities wear reflective vests. Workers will not work in street areas unless flaggers, signs, barricades and/or cones are used.
2. Inspect first aid kit, eye wash station, and fire extinguisher.	Failure to have proper medical supplies during emergency could result in inadequate treatment of personnel or potentially increase injuries.	Ensure that first aid kit contains all necessary supplies and that eye wash station is capable of supplying 15-minute steady supply of solution.
3. Inspect equipment daily.	Failure to conduct daily inspection of equipment may cause injury to personnel and or property damage.	Ensure that all operating components, parts, systems, and mechanisms will operate as intended and inspected by a qualified person. Ensure that a copy of the inspection form is available and on file.
4. Locate utilities.	Failure to identify underground, as well as overhead hazards, may result in personal injury and or property damage.	Ensure that USA has identified all underground utilities prior to any clearing or grubbing. The contact number for northern California is 1-800-227-2600.
	See AHA #3 on Geophysical Survey	
5. Use heavy equipment.	Workers could be struck by or against heavy equipment.	Wear high-visibility outerwear. Make eye contact with operator (with acknowledgement) prior to approaching any heavy equipment. Review and understand posted hand signals. Use signs, flags, and spotters.
	Contact with radioactive-contaminated equipment could contaminate personnel.	Wear appropriate PPE identified in the Site-specific Health and Safety Plan. Ensure that good hygiene practices are followed such as washing thoroughly prior to eating meals.
	Workers could be exposed to dust, potentially biologically contaminated dust, radioactive dust, chemically contaminated dust, and asbestos-contaminated dust.	Minimize the area that is to be disturbed for sampling. Wear Level D PPE.
6. Use chain saw during clearance operations.	Workers could be struck by flying debris or be struck by or against equipment.	Follow manufacturers' recommended guidelines for safe operation of equipment. Wear chaps if operating a chain saw. Ensure that saw has not been "rigged" to stay in the "on" position --- saw must automatically shut off when the trigger is released.

ACTIVITY HAZARD ANALYSIS (AHA) #2		
Clearing and Grubbing for Alameda Point		
Created by: Cliff Stephan, CHP		Reviewed by: Roger Margotto, CIH
Job Steps	Possible Hazards	Protection Against Hazards
7. Fuel equipment.	Workers may come into contact with fuel when refueling.	Review MSDS prior to handling fuels. Follow instructions on bonding and grounding. Wear appropriate PPE. Take precautions to prevent spills from occurring. Fuel only in designated areas that have spill protection and control. Have spill kits available and clean up all spills immediately.
8. Use mowers and brush hogs.	Refueling may cause spills and fire. Operation of equipment may cause debris to fly out from the decking area. Mower and or towing unit for brush hog may tip over while being operated.	Refuel equipment on a level surface after engine has cooled. Do not smoke while refueling. Wear proper PPE including hearing protection. Ensure that other individuals maintain safe distances while equipment is in operation. Ensure that equipment checks are completed daily and follow manufacturer guidelines. Never ride or pull equipment along the horizontal plane of a steep slope. Ride perpendicular to the grade. Operate at safe speeds. Be observant for pits, depressions, large rocks and any other object that can destabilize equipment.
9. Load and haul materials.	Struck by limbs, branches, etc.	Do not walk under suspended loads. Ensure that all waste material is compatible and acceptable for proper disposal.
10. Demobilize.	Slip, trips, falls, pinch points, back and muscle strain could occur.	Use proper lifting techniques when demobilizing. Be aware of pinch points and use leather gloves. Get help with loads of 50 or more pounds.

Notes:

AHA – Activity Hazard Analysis
 CHP – Certified Health Physicist
 CIH – Certified Industrial Hygienist
 MSDS – Material Safety Data Sheet
 PPE – personal protection equipment
 USA – Underground Service Alert

ACTIVITY HAZARD ANALYSIS (AHA) #3**Surveying Activities at Alameda Point**

Created by: Cliff Stephan, CHP

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to survey select areas of Alameda Point. Surveying may include but not be limited to radiological, chemical, biological, geophysical, bathymetric, and land surveys.		
1. Inspect work area.	Failure to inspect work area may result in trips and falls from the same level.	Ensure that work area is free from potential trip hazards and that only a minimum number of authorized personnel are permitted in the work zone.
2. Inspect first aid kit, eye wash station, and fire extinguisher.	Failure to have proper medical supplies during emergency could result in inadequate treatment of personnel or potentially increase injuries.	Ensure that first aid kit contains all necessary supplies and that eye wash station is capable of supplying 15-minute steady supply of solution.
3. Inspect and calibrate survey equipment daily.	Failure to conduct daily inspection and calibrations may result in false or inaccurate readings.	Ensure that all operating components, parts, systems, and mechanisms will operate as intended and inspected by a qualified person. Ensure that a copy of the inspection and calibration form is available and on file.
4. Survey.	Local vehicle traffic could strike and injure surveyors.	Ensure that all individuals participating in the survey wear reflective vests. Workers will not work in street areas unless flaggers, signs, barricades and/or cones are used.
	Workers could come in contact with radioactive material contaminating office furniture and equipment, etc.	Wear appropriate protection defined in the SHSP. Ensure that good hygiene practices are followed such as washing thoroughly prior to eating meals.
	Workers could be exposed to dust, potentially biologically contaminated dust, radioactive dust, chemically contaminated dust, and asbestos-contaminated dust.	Minimize the area that is to be disturbed for sampling. Wear Level D PPE at a minimum or what is prescribed in the SHSP.
5. Conduct radiological survey.	Ensure that RCTs performing the surveys are qualified.	Ensuring that RCTs are qualified. This will minimize incorrect calibration and sampling procedures.
	Non-use of dosimetry could cause injury to worker.	Ensure that all workers are wearing dosimeters if required by the SHSP.
	Failure to establish background readings could cause injury to worker.	Ensure that background readings are established prior to actual survey to properly interpret data.
	Site workers may not be signed off on the Radiological Survey Work Plan.	Ensure that all site workers receive the proper training and sign off on the Radiological Survey Work Plan.
6. Decontaminate all reusable materials and equipment.	Lifting of equipment and materials could cause strain to worker.	Use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use hand truck if needed. For loads greater than 50 pounds, use two people to lift.
7. Document findings.	Failure to document survey findings could result in additional surveys.	Ensure that qualified RCTs are aware of documentation procedure.
8. Demobilize site.	Slips, trips, falls, pinch points, back/muscle strain.	Follow Radiological Survey Work Plan and addendum. Use proper lifting techniques when demobilizing. Be aware of pinch points and use leather gloves. Get help with loads in excess of 50 pounds.

Notes:

AHA – Activity Hazard Analysis
CHP – Certified Health Physicist
CIH – Certified Industrial Hygienist
PPE – personal protection equipment
RCT – Radiological Control Technician
SHSP – Site-specific Health and Safety Plan

ACTIVITY HAZARD ANALYSIS (AHA) #4		
Use of Self-propelled Elevating Work Platforms at Alameda Point		
Created by: Cliff Stephan, CHP		Reviewed by: Roger Margotto, CIH
Job Steps	Possible Hazards	Protection Against Hazards
Each machine will meet ANSI specifications and will be inspected and operated as specified in the manufacturer's operating instructions. All workers must have a certificate of training, documenting that they have received training in the use of the equipment and that they meet the company's requirement for the use of the equipment.		
1. Inspect elevating work platform.	Failure to inspect equipment properly could cause workers to use a defective unit causing injury to workers and possible damage to the equipment and nearby property.	Inspect unit each day before use by following the manufacturer's pre-start inspection procedure.
2. Position elevating work platform.	Unit could come in contact with overhead obstructions, such as I-beams and overhead utilities. Equipment could tip over due to uneven ground, holes or obstacles.	Inspect area before positioning the unit. Observe for overhead hazards, obstacles, uneven ground obstacles and depressions.
3. Test operation of elevating work platform.	Failure to test platform before use could cause workers to be injured by malfunctioning equipment.	Follow manufacturer's operating instructions. Operator's manual must be available on site.
4. Climb on to elevating work platform.	Worker could fall while climbing into the unit. Worker could hit head on top rail as gate rail is lifted to crawl under top rail to gain access.	Normally, workers enter the platform when it is positioned on ground. Otherwise, follow manufacturer's instructions. Use equipment footholds and handholds provided for safe access. Do not carry materials since three-points of contact must be made while climbing. Use one hand to hold rail up while crawling under rail gate. Wear hard hat.
5. Carry and place needed work items and tools on platform.	Materials could be heavy, causing injury to worker when lifting. Weight of workers, plus materials, could exceed capacity of platform.	Workers will not lift loads heavier than 50 pounds without assistance. Ensure that the rated capacity of the platform is not exceeded (stamped on plate on platform).
6. Connect lanyard to full-body harness and to designated point inside work platform.	Failure to connect lanyard could cause worker to fall out of platform during use.	A ground supervisor should verify that each worker is wearing a full-body harness and that the lanyard connections are made before allowing the unit to be raised. Supervisors will monitor compliance throughout the day.
7. Operate platform.	Failure to follow operating instructions could cause injury to worker and nearby personnel. Could cause damage to unit and nearby property.	Follow operating instructions. Supervisor must review operation of platform with project team. Ensure that operators are properly trained.
8. Raise platform.	Failure to clear above, on sides and bottom of platform when raising, lowering, swinging and telescoping could cause injury to worker and damage to platform or other property.	Always check clearances at all times. Communicate with ground supervisor.
9. Move elevating work platform.	Obstructions could be present around machine and overhead. Uneven ground, holes, depressions could cause injury to workers and damage to platform or other property.	Follow operating instructions. Unit may be moved with personnel in platform as manufacturer permits, as long as boom is over rear (drive) axle in line with direction of travel. Maintain communications with a ground supervisor.
10. Lower elevating work platform.	Platform could crush nearby workers or hit objects placed in area after machine was positioned.	Always keep the area under the machine and within 6 feet of the machine clear of people and objects. Lower elevating work platform to ground. DO NOT leave in an elevated position.

ACTIVITY HAZARD ANALYSIS (AHA) #4

Use of Self-propelled Elevating Work Platforms at Alameda Point

Created by: Cliff Stephan, CHP

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
11. Exit elevating work platform; remove lanyard; climb off.	Worker could fall while attempting to walk the boom. Worker could fall out of platform if platform is not on ground and lanyard is disconnected prematurely.	Never walk the boom. Use handholds and footholds for proper egress from unit or exit at ground level by placing platform on ground and turning off power to boom, before disconnecting lanyard and opening gate. Ensure that elevating work platform has been lowered to ground and is not elevated.

Notes:

AHA – Activity Hazard Analysis

ANSI – American National Standards Institute

CHP – Certified Health Physicist

CIH – Certified Industrial Hygienist

ACTIVITY HAZARD ANALYSIS (AHA) #5**Use of All Terrain Vehicles at Alameda Point**

Created by: Jennifer Amdursky

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to detail the proper use of ATVs.		
1. Receive vehicles and inspect.	Defective vehicle could cause injury to workers.	Using operator's manual, inspect vehicle as specified by the manual. Pay particular attention to the steering, brakes and tires. Check function of horn, tail lights, and stop lights.
	ATV without muffler could cause noise and fires. A fire could occur from sparks from vehicles.	Vehicles must have mufflers and spark arrestors.
	An ATV that does not meet the requirements of EM 385-1-1 could result in injury.	Class I ATV must be less than 800 pounds and less than 50 inches wide. Vehicle must have four wheels.
2. Verify training of operators.	Operators who are not trained could have accidents and injure themselves or other workers.	All operators will have completed a nationally recognized ATV training course. The operator must pass an operating skills test. Proof of training must be available.
3. Connect trailer with survey equipment to the ATV.	Trailer connection could fall on workers' feet causing injury.	Keep feet away from the connection, wear steel-toe boots.
	Connection of trailer to ATV could fail, causing damage to equipment or injury to workers.	Keep feet away from the connection, wear steel-toe boots.
	Lifting trailer hitch end could cause strain or back injury to the worker.	Use only an approved trailer hitch for the type of ATV. Payload will not exceed the capacity of the ATV. Get help in raising trailer to the hitch.
4. Operate vehicle.	Failure to operate vehicle could cause damage to property or injury of workers.	Use training and follow manufacturer's requirements for operation. Operate vehicle only at safe speeds.
	Carrying passengers could cause injury to the passengers.	Carrying passengers is prohibited.
	Vehicle may not be visible in all areas.	Vehicles will have a high-visibility flag or windsock so that their location can be readily ascertained by workers in the area. ATVs will be operated only during daylight hours.
	Failure to wear proper PPE could result in injury.	Workers will wear gloves and an approved motorcycle helmet with full faceshield or goggles.
5. Refuel vehicle.	When refueling vehicles, there is potential for exposure to gasoline, fires, and damage to environment.	Wear appropriate PPE. Refuel only when engine is off and has been cooled slightly. Have fire extinguisher 20-pound dry chemical ABC within 75 feet of refueling point (but not too close). No smoking or source of heat or flame is permitted. Have spill control supplies available and ready for use. Refuel only in a designated area.
6. Store fuel (it is presumed that gasoline is used for the ATVs).	Improper storage could cause spill or potential fires.	Gasoline will be stored only in approved metal safety cans not exceeding 5 gallons each.

Notes:

ATV – all-terrain vehicle

EM – Engineer Manual

PPE – personal protective equipment

ACTIVITY HAZARD ANALYSIS (AHA) #6		
Waste Characterization, Transport, and Disposal for Alameda Point		
Created by: Jennifer Amdursky		Reviewed by: Roger Margotto, CIH
Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to outline the safety procedures for carrying out waste characterization, transport, and disposal for IR Sites 32, 1, and 2.		
1. Place/pour waste into containers (e.g., 55-gallon drum, roll-off bin, etc.).	Lifting of wastes could cause strain to worker.	Use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use hand truck if needed. If possible, do not create loads greater than 50 pounds. If loads are greater than 50 pounds, use two people to lift.
	Worker could be exposed to chemical contaminants.	Wear required PPE. Visual inspection and ambient air monitoring will determine selection of PPE and respiratory protection. Decontaminate exteriors of tools or buckets used to transport wastes to containers. Avoid spills. Ensure that spill cleanup supplies are available.
2. Load drums onto vehicle.	Handling of drums can expose worker to injury (including, but not limited to, strains, lacerations, and pinch points).	Ensure that each drum is properly labeled and when drums are placed on truck, that labels are visible. Use truck that has "Tommy Lift" and move drum using drum dolly onto lift. Ensure that drum is secure and will not roll when lift is raised. Wheel drum to appropriate location on truck for transport. Be sure to evenly distribute load weight on bed of truck. Secure drums in place on the truck. If drums are loaded with drum handling device, attached to backhoe or excavator, stand away from truck when drum is placed on truck. Once drum is in place and "loader" moves away from truck, use drum dolly on truck to position drum. Avoid placing pallets of drums on truck, unless pallets can be positioned where they will remain for transport. (It is very difficult to move loaded pallets manually.)
	Worker could be struck by vehicles.	Wear high-visibility reflective vests at all times in work areas. Make eye contact with operators of vehicles. Post an observer, as needed, when loading drums close to busy streets. Use traffic controls or barricades, if necessary, to keep traffic away from workers.
3. Transport drums to temporary storage location.	Drums may leak presenting spill and slip hazards.	Inspect all drums prior to and following transport. Have spill cleanup supplies and equipment readily available. Surface may become slippery. Wear work boots with good traction soles. Avoid exposure to material. Wear appropriate PPE. Clean up all spills immediately. Notify supervisor.

ACTIVITY HAZARD ANALYSIS (AHA) #6**Waste Characterization, Transport, and Disposal for Alameda Point**

Created by: Jennifer Amdursky

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
	<p>Handling of drums can expose worker to injury (including, but not limited to, strains, lacerations, and pinch points).</p> <p>Slip, trip, and fall hazards could be present.</p>	<p>If handling drums, use drum dolly, pallet on forklift, or drum grabber attached to backhoe or excavator to move drums into storage. If handling drums, inspect path that drum must be moved over. Ensure that there are no ruts or other obstacles that can cause drum to tip over or be difficult to handle over surface being traversed. Place drums in approved storage area. When manually handling drums, avoid placing hands between drums and pinching fingers. Wear leather work gloves. If drums have to be manually positioned, know how to "break and roll" drum. Avoid manually positioning drums if at all possible. Only one person should "break and roll" drum if necessary to manually move drum without mechanical assistance.</p> <p>Maintain good housekeeping and proper illumination in storage area.</p>
4. Store drums in temporary storage location pending characterization.	Drums may leak presenting spill and slip hazards.	Inspect all containers on a regular basis (weekly for non-hazardous materials, daily for hazardous materials). Have spill cleanup supplies and equipment readily available. Surface may become slippery. Wear work boots with good traction soles. Avoid exposure to material. Wear appropriate PPE. Clean up all spills immediately. Notify supervisor.
5. Remove cover of containers for sampling.	<p>Lifting drum lids may cause injury, particularly to fingers and hands.</p> <p>Worker could experience strain from use of tools.</p> <p>Containers could contain atmospheric hazards, thus exposing worker to vapors.</p>	<p>Identify and avoid pinch points, such as placing hands between drum lid and drum. Wear leather work gloves when removing and replacing drum lids.</p> <p>Inspect all tools for damage before use. Do not use damaged tools (mark and tag "out of service"). Select hand tools to minimize following stressors: chronic muscle contraction or steady force; extreme or awkward finger/hand/arm positions; repetitive forceful motions; or excessive gripping, pinching, or pressing with hands and fingers.</p> <p>Before fully lifting container covers, place probe through small opening and measure air inside using a PID or FID. If reading is less than 10 ppm, open cover and proceed with sampling. If reading is greater than 10 ppm, remove cover slowly and stand back to allow cover to ventilate. Measure air inside again after 5 minutes, and if readings are still above 10 ppm, contact the SHSS.</p>
6. Collect sample of waste.	Worker could be exposed to chemical contaminants.	Wear required PPE. Visual inspection and ambient air monitoring will determine selection of PPE and respiratory protection. Decontaminate exteriors of sample containers. Avoid spills. Ensure that spill cleanup supplies are available.

ACTIVITY HAZARD ANALYSIS (AHA) #6		
Waste Characterization, Transport, and Disposal for Alameda Point		
Created by: Jennifer Amdursky		Reviewed by: Roger Margotto, CIH
Job Steps	Possible Hazards	Protection Against Hazards
7. Replace container covers.	Replacing drum lids may cause injury, particularly to fingers and hands.	Use care when replacing drum lids. Wear leather gloves when handling lids.
	Worker could experience strain from use of tools.	Inspect all tools for damage before use. Do not use damaged tools. Mark and tag "out of service." Select hand tools to minimize the following stressors: chronic muscle contraction or steady force; extreme or awkward finger/hand/arm positions; repetitive forceful motions; or excessive gripping, pinching, or pressing with hands and fingers.
8. Pack samples for shipment.	Manually moving materials and equipment could cause strains.	Use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use hand truck when handling more than one box at a time. Try to pack shipping boxes so that each box does not exceed 50 pounds. For loads greater than 50 pounds, use two people to carry.
	Contents of sample containers could leak, causing exposure to worker and possibly to people handling shipping box.	Ensure that each container top is securely tightened. Pack each container in a manner to prevent damage to container during handling of shipping box and during transportation. Ensure that boxes meet required packaging standards based on mode of transportation used for shipping.
9. Decontaminate all reusable materials and equipment.	Lifting of equipment and materials could cause strain to worker.	Use proper lifting techniques such as keeping the back straight, lifting with legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use hand truck if needed. For loads greater than 50 pounds, use two people to lift.
	Worker could be exposed to chemical contaminants.	Avoid spills. Ensure that spill cleanup supplies are available. Wear required PPE and respiratory protection as specified in the SHSP. Visual inspection and ambient air monitoring will determine selection of PPE and respiratory protection. Remove PPE properly and wash hands.
	Decontamination area may become slippery.	Visually inspect work areas and mark, barricade, or eliminate slip, trip, and fall hazards as feasible. Maintain proper illumination in all work areas. If decontaminating on plastic sheeting, use caution since plastic sheeting is extremely slippery. Wear boots with good traction.

ACTIVITY HAZARD ANALYSIS (AHA) #6		
Waste Characterization, Transport, and Disposal for Alameda Point		
Created by: Jennifer Amdursky		Reviewed by: Roger Margotto, CIH
Job Steps	Possible Hazards	Protection Against Hazards
10..Load containers for transport.	Handling of containers can expose worker to injury (including, but not limited to, strains, lacerations, and pinch points).	Ensure each drum is properly labeled and when drums are placed on truck, that labels are visible. (Use new labels as appropriate based on analytical results.) Use truck that has "Tommy Lift" and move drum using drum dolly onto lift. Ensure that drum is secure and will not roll when lift is raised. Wheel drum to appropriate location on truck for transport. Be sure to evenly distribute load weight on bed of truck. Secure drums in place on the truck. If drums are loaded with drum handling device attached to backhoe or excavator, stand away from truck when drum is placed on truck. Once drum is in place and "loader" moves away from truck, use drum dolly on truck to position drum. Avoid placing pallets of drums on truck, unless pallets can be positioned where they will remain for transport. (It is very difficult to move loaded pallets manually.)
	Worker could be struck by vehicles.	Wear high-visibility reflective vests at all times in work areas. Make eye contact with operators of vehicles. Post an observer, as needed, when loading drums close to busy streets. Use traffic controls or barricades, if necessary, to keep traffic away from workers.
	Containers may leak.	Inspect all containers prior to transport. Have spill cleanup supplies and equipment readily available. Surface may become slippery. Wear work boots with good traction soles. Avoid exposure to material. Wear appropriate PPE. Clean up all spills immediately. Notify supervisor.

Notes:

- AHA – Activity Hazard Analysis
- CIH – Certified Industrial Hygienist
- FID – flame ionization detector
- IR – Installation Restoration
- PID – photoionization detector
- PPE – personal protective equipment
- ppm – parts per million
- SHSP – Site-specific Health and Safety Plan
- SHSS – Site Health and Safety Specialist

ACTIVITY HAZARD ANALYSIS (AHA) #7**Sampling Activities at Alameda Point**

Created by: Cliff Stephan

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
The intent of this AHA is to sample areas of IR Sites 1, 2 and 32. Sampling may include but not be limited to area, personal, bulk, random, and swipe samples.		
1. Inspect work area.	Failure to inspect work area may result in trips and falls from the same level due to uneven work surfaces.	Ensure that work area is free from potential trip hazards and that only a minimum number of authorized personnel are permitted in the work zone.
2. Inspect first aid kit, eye wash station, and fire extinguisher.	Failure to have proper medical supplies during emergency could result in inadequate treatment of personnel or potentially increase injuries.	Ensure that first aid kit contains all necessary supplies and that eye wash station is capable of supplying 15-minute steady supply of solution.
3. Inspect and calibrate sampling equipment daily.	Failure to conduct daily inspection and calibrations may result in false or inaccurate readings.	Ensure that all operating components, parts, systems, and mechanisms are inspected by a qualified person and will operate as intended Ensure that a copy of the inspection and calibration form is available and on file.
4. Collect samples.	Local vehicle traffic could strike and injure samplers.	Ensure that all individuals participating in the survey wear reflective vests. Workers will not work in street areas unless flaggers, signs, barricades and/or cones are used.
	Workers could come in contact with radioactive material contaminating vegetation, soil, office furniture, equipment, etc.	Wear appropriate protection defined in the SHSP. Ensure that good hygiene practices are followed such as washing thoroughly prior to eating meals.
	Sampling tools such as knives, scoops, spoons, augers, etc., can cause injury to personnel if used incorrectly.	Ensure that all samplers are familiar with the tools and equipment selected for sampling. All samplers should be able to demonstrate to the Sampling Lead they are familiar with the tools and their function.
	Failure to decontaminate sampling tools may cross-contaminate future samples.	Ensure that the protocol defined in the SAP is followed.
	Cut vegetation can cause injury while samples are being collected.	Vegetative grasses, brush, etc., can cause cuts and puncture wounds if handled improperly.
	Workers could be exposed to dust, potentially biologically contaminated dust, radioactive dust, chemically contaminated dust, and asbestos-contaminated dust.	Minimize the area that is to be disturbed for sampling. Wear appropriate PPE as prescribed by the SHSP.
5. Label samples.	Failure to label sample jars, cores, containers, etc., may result in false identification.	Ensure that samplers are familiar with the identification system defined in the SAP.
	Failure to affix chain-of-custody labels may result in noncompliance with established work protocol.	Ensure that application of chain-of-custody seals follow the SAP protocol.
6. Decontaminate tools.	Failure to decontaminate sampling tools may cross-contaminate future samples.	Ensure that the protocol defined in the SAP is followed.
7. Document findings.	Failure to document findings could result in additional sampling or surveys.	Ensure that qualified technicians are aware of documentation procedures.

ACTIVITY HAZARD ANALYSIS (AHA) #7**Sampling Activities at Alameda Point**

Created by: Cliff Stephan

Reviewed by: Roger Margotto, CIH

Job Steps	Possible Hazards	Protection Against Hazards
8. Demobilize.	Slips, trips, falls, pinch points, back/muscle strain could occur.	Use proper lifting techniques when demobilizing. Be aware of pinch points and use leather gloves. Get help with loads in excess of 50 pounds. Ensure that good hygiene practices are followed and that all samplers wash thoroughly prior to taking any food or drink.

Notes:

AHA – Activity Hazard Analysis

CHP – Certified Health Physicist

CIH – Certified Industrial Hygienist

IR – Installation Restoration

PPE – personal protective equipment

SAP – Sampling and Analysis Plan

SHSP – Site-specific Health and Safety Plan

ATTACHMENT 5
FORMS



DAILY BRIEFING SIGN-IN SHEET

Date: _____ Project Name/Location: _____

Shift/Department: _____ Person Conducting Briefing: _____

1. AWARENESS (e.g., special EHS concerns, pollution prevention, recent incidents, etc.):

2. OTHER ISSUES (EHS Plan changes, attendee comments, etc.):

3. ATTENDEES (Print Name):

1.	21.
2.	22.
3.	23.
4.	24.
5.	25.
6.	26.
7.	27.
8.	28.
9.	29.
10.	30.
11.	31.
12.	32.
13.	33.
14.	34.
15.	35.
16.	36.
17.	37.
18.	38.
19.	39.
20.	40.



Daily Briefing Sign-In Sheet
(Continued)

41.	56.
42.	57.
43.	58.
44.	59.
45.	60.
46.	61.
47.	62.
48.	63.
49.	64.
50.	65.
51.	66.
52.	67.
53.	68.
54.	69.
55.	70.

Give completed documentation to ESO.



SITE SAFETY BRIEFING FORM

Site: _____

Date: _____

Time: _____

OFS No.: _____

Task: _____

Health/Safety Officer: _____

Person Providing Briefing: _____

TOPICS:

- Site SHSP
- Chemical Hazards
- Equipment Hazards
- Electrical Hazards
- Heat Stress
- Personal Decontamination
- Personal Hygiene
- Employee Rights/Responsibilities
- Hazard Evaluations
- Emergency Response Procedures

PERSONS IN ATTENDANCE:
(Name/Organization)

PERSONS IN ATTENDANCE:
(Name/Organization)

NOTES/COMMENTS:



MEDICAL DATA SHEET

Project: _____

Name: _____

Home Telephone Number: _____

Home Address: _____

Age: _____ **Height:** _____ **Weight:** _____ **Blood Type:** _____

Name of Emergency Contact: _____

Telephone Number of Emergency Contact: _____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do you wear contact lenses? _____

Provide a checklist of previous illness or exposures to hazardous chemicals: _____

What medications are you presently using? _____

Do you have any medical restrictions? If yes, explain: _____

Name, address, and phone number of personal physician:



**TETRA TECH EC, INC.
INCIDENT/NEAR MISS REPORT AND INVESTIGATION**

TYPE OF INCIDENT - CHECK ALL THAT APPLY

- INJURY/ILLNESS VEHICLE DAMAGE PROPERTY DAMAGE FIRE
 - SPILL/RELEASE PERMIT EXCEEDENCE HIGH LOSS POTENTIAL OTHER
- (NEAR MISS)

GENERAL INFORMATION

PROJECT/OFFICE: _____ REPORT #: _____ DATE OF REPORT: _____

DATE OF INCIDENT: _____ MILITARY TIME: _____ DAY OF WEEK: _____

TtEC SUPERVISOR ON DUTY: _____ AT SCENE OF INCIDENT: YES NO

LOCATION OF INCIDENT: _____

WEATHER CONDITIONS: _____ ADEQUATE LIGHTING AT SCENE: YES NO N/A

DESCRIBE WHAT HAPPENED (STEP BY STEP - use additional pages if necessary)

AFFECTED EMPLOYEE INFORMATION

(Include injured person, driver/operator, or employee whose activities resulted in the incident. Use another page to provide information for additional employees)

NAME: _____ TtEC EMPLOYEE: YES NO

HOME ADDRESS: _____

SOCIAL SECURITY #: _____ HOME PHONE #: _____

JOB CLASSIFICATION: _____ YEARS IN JOB CLASSIFICATION: _____

HOURS WORKED ON SHIFT PRIOR TO INCIDENT: _____ YEARS WITH TtEC: _____ AGE: _____

DID INCIDENT RELATE TO ROUTINE TASK FOR JOB CLASSIFICATION: YES NO

INJURY/ILLNESS INFORMATION

NATURE OF INJURY OR ILLNESS: _____

OBJECT/EQUIPMENT/SUBSTANCE CAUSING HARM: _____

FIRST AID PROVIDED: YES NO

IF YES, WHERE WAS IT GIVEN: ON SITE OFF SITE

IF YES, WHO PROVIDED FIRST AID: _____

WILL THE INJURY/ILLNESS RESULT IN: RESTRICTED DUTY LOST TIME UNKNOWN



MEDICAL TREATMENT INFORMATION

WAS MEDICAL TREATMENT PROVIDED?: YES NO

IF YES, WAS MEDICAL TREATMENT PROVIDED: ON SITE DR.'S OFFICE HOSPITAL

NAME OF PERSON(S) PROVIDING TREATMENT:

ADDRESS WHERE TREATMENT WAS PROVIDED:

TYPE OF TREATMENT:

VEHICLE AND PROPERTY DAMAGE INFORMATION

VEHICLE/PROPERTY DAMAGED:

DESCRIPTION OF DAMAGE:

SPILL AND AIR EMISSIONS INFORMATION

SUBSTANCE SPILLED OR RELEASED: FROM WHERE: TO WHERE:

ESTIMATED QUANTITY/DURATION:

CERCLA HAZARDOUS SUBSTANCE? YES NO RQ EXCEEDED? YES NO SPECIFY: _____

REPORTABLE TO AGENCY? YES NO SPECIFY: _____

WRITTEN REPORT? YES NO TIME FRAME: _____

RESPONSE ACTION TAKEN

PERMIT EXCEEDENCE

TYPE OF PERMIT: PERMIT #:

DATE OF EXCEEDENCE: DATE FIRST KNOWLEDGE OF EXCEEDENCE:

PERMITTED LEVEL OR CRITERIA (e.g., Water quality):

EXCEEDENCE LEVEL OR CRITERIA: EXCEEDENCE DURATION:

REPORTABLE TO AGENCY? YES NO SPECIFY: _____

WRITTEN REPORT? YES NO TIME FRAME: _____

RESPONSE ACTION TAKEN:

NOTIFICATIONS

NAME(S) OF TtEC PERSONNEL NOTIFIED: DATE/TIME:

CLIENT NOTIFIED: DATE/TIME:

AGENCY NOTIFIED: DATE/TIME: NOT REQUIRED

CONTACT NAME:

PERSONS PREPARING REPORT

EMPLOYEE'S NAME: (PRINT) SIGN:

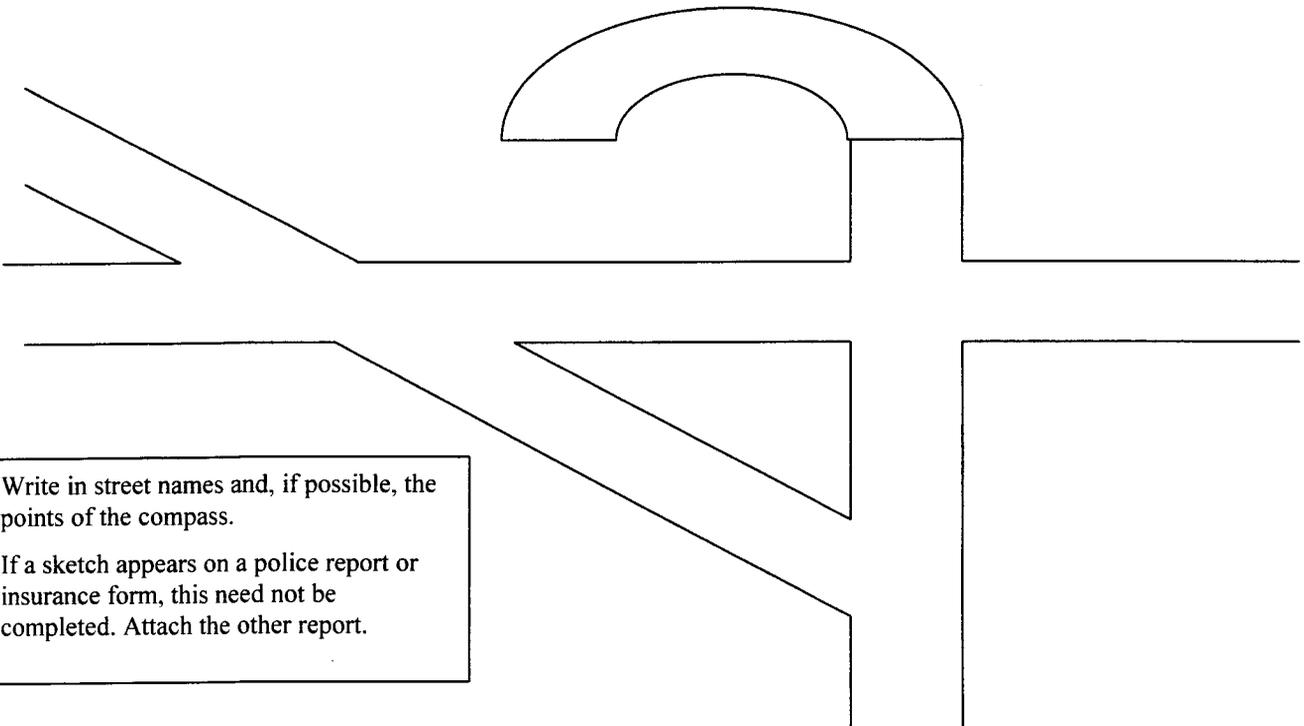
EMPLOYEE'S NAME (PRINT) SIGN:

SUPERVISOR'S NAME: (PRINT) SIGN:

NOTE: Supervisor to forward a copy of Incident Report to immediate supervisor, PESM, ESS or ESC, and other personnel identified in Table 1 of this procedure ASAP, but no later than 24 hours.

INCIDENT SKETCH

VEHICLE INCIDENTS



Write in street names and, if possible, the points of the compass.

If a sketch appears on a police report or insurance form, this need not be completed. Attach the other report.

INVESTIGATIVE REPORT

DATE OF INCIDENT: _____

DATE OF INVESTIGATION REPORT: _____

INCIDENT COST: ESTIMATED: \$ _____		ACTUAL: \$ _____	
OSHA RECORDABLE(S): <input type="checkbox"/> YES <input type="checkbox"/> NO		# RESTRICTED DAYS _____	# DAYS AWAY FROM WORK _____
CAUSE ANALYSIS			
Was the activity addressed in an AHA?		<input type="checkbox"/> YES (Attach a copy)	<input type="checkbox"/> NO
IMMEDIATE CAUSES – WHAT ACTIONS AND CONDITIONS CONTRIBUTED TO THIS EVENT? (USE NEXT PAGE)			
BASIC CAUSES - WHAT SPECIFIC PERSONAL OR JOB FACTORS CONTRIBUTED TO THIS EVENT? (USE NEXT PAGE)			
ACTION PLAN			
REMEDIAL ACTIONS - WHAT HAS AND OR SHOULD BE DONE TO CONTROL EACH OF THE CAUSES LISTED? INCLUDE MANAGEMENT PROGRAMS (SEE ATTACHED LIST) FOR CONTROL OF INCIDENTS IF APPLICABLE			
ACTION	PERSON RESPONSIBLE	TARGET DATE	COMPLETION DATE
PERSONS PERFORMING INVESTIGATION			
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
INVESTIGATOR'S NAME: (PRINT)	SIGN:	DATE:	
MANAGEMENT REVIEW			
PROJECT/OFFICE MANAGER (PRINT)	SIGN:		
COMMENTS:			
PESM or ESC (PRINT)	SIGN:		
COMMENTS:			
<p>NOTE: Attach additional information as necessary. Supervisor to forward copy of Investigative Report to the PM or OM, PESM or ESC ASAP, but no later than 72 hours after the incident. A copy shall be sent to the Director, Health and Safety Programs within 24 hours of completion of the report.</p>			

EXAMPLES OF IMMEDIATE CAUSES

SUBSTANDARD ACTIONS

1. OPERATING EQUIPMENT WITHOUT AUTHORITY
2. FAILURE TO WARN
3. FAILURE TO SECURE
4. OPERATING AT IMPROPER SPEED
5. MAKING SAFETY DEVICES INOPERABLE
6. REMOVING SAFETY DEVICES
7. USING DEFECTIVE EQUIPMENT
8. FAILURE TO USE PPE PROPERLY
9. IMPROPER LOADING
10. IMPROPER PLACEMENT
11. IMPROPER LIFTING
12. IMPROPER POSITION FOR TASK
13. SERVICING EQUIPMENT IN OPERATION
14. UNDER INFLUENCE OF ALCOHOL/DRUGS
15. HORSEPLAY

SUBSTANDARD CONDITIONS

1. GUARDS OR BARRIERS
2. PROTECTIVE EQUIPMENT
3. TOOLS, EQUIPMENT, OR MATERIALS
4. CONGESTION
5. WARNING SYSTEM
6. FIRE AND EXPLOSION HAZARDS
7. POOR HOUSEKEEPING
8. NOISE EXPOSURE
9. EXPOSURE TO HAZARDOUS MATERIALS
10. EXTREME TEMPERATURE EXPOSURE
11. ILLUMINATION
12. VENTILATION
13. VISIBILITY

EXAMPLES OF BASIC CAUSES

PERSONAL FACTORS

1. CAPABILITY
2. KNOWLEDGE
3. SKILL
4. STRESS
5. MOTIVATION

JOB FACTORS

1. SUPERVISION
2. ENGINEERING
3. PURCHASING
4. MAINTENANCE
5. TOOLS/EQUIPMENT
6. WORK STANDARDS
7. WEAR AND TEAR
8. ABUSE OR MISUSE

MANAGEMENT PROGRAMS FOR CONTROL OF INCIDENTS

- | | |
|---|--|
| <ol style="list-style-type: none">1. LEADERSHIP AND ADMINISTRATION2. MANAGEMENT TRAINING3. PLANNED INSPECTIONS4. TASK ANALYSIS AND PROCEDURES5. TASK OBSERVATION6. EMERGENCY PREPAREDNESS7. ORGANIZATIONAL RULES8. ACCIDENT/INCIDENT ANALYSIS9. PERSONAL PROTECTIVE EQUIPMENT | <ol style="list-style-type: none">10. HEALTH CONTROL11. PROGRAM AUDITS12. ENGINEERING CONTROLS13. PERSONAL COMMUNICATIONS14. GROUP MEETINGS15. GENERAL PROMOTION16. HIRING AND PLACEMENT17. PURCHASING CONTROLS |
|---|--|

NOTIFICATION REMINDER

Fatalities or hospitalization (admittance) of three or more individuals requires notification to OSHA within 8 hours. Contact the Director, Health and Safety Programs or Director, ESQ Programs to make the notification. If unavailable, the senior operations person on site should make the notification.

Incident/Near Miss Report and Investigation Instructions

General: The incident report (pages 1 and 2) must be completed within 24 hours. Do not delay the report if any information is unknown. It can be provided later by revising the Report.

Type of Incident: Check all that apply. A High Loss Potential (Near Miss) incident is one that does not result in loss, but under slightly different circumstances, could have resulted in an OSHA Recordable injury, spill, release, permit exceedance, fire, or vehicle/property damage in excess of \$500. All High Loss Potential (Near Miss) incidents are to be investigated.

General Information

Project/Office: If the incident occurs on a delivery order contract, give the contract/program name, DO# and location. If the incident occurs on a C&E field project, give the Office location managing the project as well as the project/location.

Report No.: Optional numbering field for offices/projects.

TtEC Supervisor: The TtEC Supervisor responsible for the work effort involving the incident. Do not give a subcontractor supervisor or craft foreman name. If a TtEC Supervisor was the Affected Employee, this field should contain the name of his or her supervisor. The Supervisor is the project supervisor if the incident happens on a project, or the administrative supervisor if the incident happens in the office. E.g., a geologist, acting as an FOL gets injured on a job site, or in a motor vehicle in the course of project work. The TtEC Supervisor is most likely the Project Manager. If the same geologist gets injured lifting a box in his office, the TtEC Supervisor is likely the Office Science Lead.

Location of Incident: The specific location on the project, in the office, or off-site location.

Weather Conditions: Temperature, precipitation, approximate wind speed and direction, cloud cover, relative humidity. This information may be included in the description section, and must be given in detail whenever it is a factor in the cause or impact., e.g., spill, release, heat stress, wind blown material.

Describe What Happened: This section must be completed in sufficient detail to adequately describe the events and conditions leading up to and resulting from the incident. Try to answer the questions who, what, where, when, and how. This information is then used to determine why (cause). Provide details such as work objective, procedure being used, body position, and PPE. Include diagrams or sketches for all incidents involving vehicles/equipment and other incidents where they aid in providing detail or perspective. Consider attaching photographs. Follow the guidelines in Practical Loss

Control Leadership, and consider the impact of each of the following:

P - People
E - Equipment
M - Material
E - Environment

To do an effective job, a visual inspection of the scene is usually necessary along with private interviews of affected employees and witnesses.

Where appropriate, use terms indicating the type of contact, e.g., struck by; struck against; fall from elevation; fall on same level; caught in; caught between or under; caught on; contact with; overstress; equipment failure; environmental release; fire.

Affected Employee Information

TtEC Employee: Direct hire, whether professional, administrative, or craft; full-time or part-time; permanent or temporary. If the affected employee is not a TtEC employee, give the name of the employer and business relationship (e.g., client, subcontractor) in the description section above.

Hours Worked on Shift Prior to the Incident: Only include the amount of time the employee worked that shift or day prior to the incident.

Years with TtEC: For TtEC employees, give the number of years employed with TtEC. If the employee has worked for TtEC for less than a year, do not write <1. Give the answer in fraction of year, or specify the number of months, e.g., 0.1 or 1 month.

Injury/Illness Information

Nature of Injury or Illness: If the incident resulted in an injury or illness, give a brief description of the body part affected and type of injury or illness, e.g., fractured thumb, left hand; carpal tunnel syndrome, right hand.

First Aid Provided: First Aid is any treatment that does not have to be provided by a health care professional, even if it is. E.g., a laceration that is cleaned and bandaged in a clinic may constitute first aid, if sutures are not given.

Will the Injury Result In: Do not delay the report if this information is unknown.

Medical Treatment Information

Was Medical Treatment Provided? Medical treatment is that treatment that must be provided by a licensed medical practitioner, e.g., sutures, prescription medication, etc.

Type of Treatment: This information is important in determining OSHA recordability, since some forms of treatment would not constitute a Recordable case (e.g., one-time administration of prescriptions, negative diagnostic exams). Attach a copy of the treating professional's statement/work release.

Vehicle and Property Damage Information

Vehicle/Property Damaged: For vehicles, indicate VIN and whether it is company owned or leased, business trip rental (Avis) or owned by others.

Description of Damage: Be specific as to the identity of damaged part, location and extent.

Spill and Air Emissions Information

Substance Spilled or Released: For pure substances, list materials by common name/chemical. For wastes, indicate waste code. For mixtures or contaminated media, provide contaminant name, CAS No., concentration.

RQ Exceeded? Reportable quantity. Contact your ESQ representative for guidance. Specify the RQ for the material, whether you answer yes or no.

Reportable to Agency? If yes, specify the federal, state or local agency that must be provided with verbal and/or written notification.

Written Report? Answer yes if the release requires a written report to be filed and note the time frame.

Response Action Taken: Describe the mitigation efforts, as well as any reports made, beyond initial notification.

Permit Exceedence

Type of Permit: List name of permit including the agency name where applicable (e.g., NPDES, PSAPCA NOC)

Date of Exceedence: Specify date exceedence occurred (e.g., date discharge in excess of permit limits occurred)

Date First Knowledge of Exceedence: Specify date when first knew there was an exceedence (i.e., date analytical received). This date may be different from the date of the exceedence listed above.

Permitted Level or Criteria: List numerical discharge or emission limit or narrative criteria specified in the permit (e.g.,

20% opacity limit, Best Management Practices (BMP) implementation per SWPPP).

Exceedence Level or Criteria: Specify actual numerical discharge/emission limit or narrative criteria which was exceeded (e.g., 22% opacity, failure of BMPs (silt fencing collapse) per SWPPP)

Exceedence Duration: Specify time frame by date and hours (using military time) during which exceedence occurred.

See "Spill/Release Information" (above) for description of remaining questions.

Persons Preparing Report

Employee's Name: The affected employee described on page 1 should review the report and sign here, as well as other employees witnessing or involved in the incident.

Supervisor's Name: The TtEC Supervisor must review and sign the report indicating agreement. The TtEC Supervisor and the Investigator (next page) should be the same person.

Investigative Report

Report No.: This is the same as the project/office optional report number from page 1 of the Incident/Near Miss Report.

Date of Investigative Report: This date should be within hours of the incident. In cases where the investigation is not completed until a later date, submit the incomplete report within the 72 hours, and a revised report should be submitted when the missing information is obtained.

Incident Cost: For all vehicle/equipment or property damage cases, an estimated or actual loss value must be entered. If an estimated value is entered, the report must be revised when the actual costs are known.

OSHA Recordables: This section should be completed in consultation with the PESM. If it cannot be determined at the time of the report, the PESM should consult with the Director, Health and Safety Programs and revise the report when a determination is made.

No. of Restricted Days: This relates to days of restricted work activity, not restrictions on motion or physical capability. If the employee is capable of doing his normal job the day after the injury and thereafter, there are no restricted days, even if the physician indicates a physical restriction. It does not include the day of the injury.

No. of Days Away from Work: The number of days after the day of the injury that the employee was scheduled to work but could not due to an occupational injury. If the treating physician releases an employee to return to work, but the employee chooses not to come to work, do not count those

days. In this case the PESM should contact the Director, Health and Safety Programs.

Cause Analysis

Immediate Causes: Determine the immediate causes, using the example on page 4. If one or more of the examples fits the circumstance, use those words in the cause description. This facilitates statistical analysis of the incident database for program evaluation/modification. However, do not confine your cause determination to the guide words. Explain, e.g., Improper Lifting – employee attempted to lift box by bending at the waist and twisting while lifting. Be sure that the incident description on page 1 is sufficiently detailed to support the causal analysis in this section. An assumption of cause (e.g., improper lifting) from the injury (low back pain) is not acceptable.

Basic Causes: Like the Immediate Causes, use the guide words in the attachment whenever appropriate and explain. For example, improper motivation may be because the correct way takes more time or effort; short cutting standard procedure is tolerated or positively reinforced; or the person thinks there is no personal benefit to always doing the job correctly.

Note: The investigator is encouraged to review the Practical Loss Control Leadership chapters on *Causes and Effects of Loss* and *Accident/Incident Investigation* before doing the causal analysis. As a check, the investigator may refer to the S.C.A.T. Chart available from the PESM.

Remedial Actions: Include all actions taken or those that should be taken to prevent recurrence. Be sure that actions address the causes. For example, training (safety meetings) may be a necessary response for lack of knowledge, but may be inadequate for improper motivation. If completion dates exceed the 72 hours reporting period, a revised report must be submitted when all remedial actions are complete.

Persons Performing Investigation: The primary investigator is the TtEC Supervisor in charge of the work where the incident occurred. Others participating in the investigation, such as the Project Manager, ESS, QC, site engineer, foreman, etc. should also sign the report.

Management Review: The Project or Office Manager and the PESM or office ESC must sign the report indicating their satisfaction with thoroughness of the investigation and the report, and their concurrence that the action items address the identified causes. This constitutes the peer review, and the report, particularly the description, should be clear to readers not familiar with the project or incident.



SITE SAFETY PLAN CHANGE APPROVAL FORM

N62473-06-D-2201

CTO: _____

Date _____ Amendment Number _____

Project Name: _____ Project Number: _____

Section of SHSP: _____ Page Number: _____

Change to read: _____

Reason for change: _____

Approvals: _____

Project Superintendent or Manager

SSHS

PESM (CIH)

- Initial Report
- Follow-up Report
- Final Report

Contractor Significant Incident Report (CSIR)

1. General Information		
Contracting Activity/ROICC Office:		
Accident Classification:		
<input type="checkbox"/> Injury <input type="checkbox"/> Fatality <input type="checkbox"/> Environment <input type="checkbox"/> Procedural Issues <input type="checkbox"/> Lessons Learned <input type="checkbox"/> Illness <input type="checkbox"/> Property Damage <input type="checkbox"/> Other _____		
Involving:		
<input type="checkbox"/> Confined Space <input type="checkbox"/> Equip/Mrt Ver/Mat Handling (Heavy Construction Equip.) <input type="checkbox"/> Hazardous Material <input type="checkbox"/> Crane and Rigging <input type="checkbox"/> Equip/Mrt Ver/Mat Handling (Material Handling) <input type="checkbox"/> Trenching/Excavation <input type="checkbox"/> Diving <input type="checkbox"/> Equip/Mrt Ver/Mat Handling (Man-Lift/Elevated Platform) <input type="checkbox"/> Waterfront/Marine Operations <input type="checkbox"/> Demolition/Renovation <input type="checkbox"/> Fall from Ladder <input type="checkbox"/> Fall from Scaffold <input type="checkbox"/> Other _____ <input type="checkbox"/> Electrical <input type="checkbox"/> Fall from Roof <input type="checkbox"/> Fire		
2. Personal Information		
Name (Last, First, MI):		Age:
		Sex:
Job Title/Description:		Employed By:
Supervisor Name (Last, First, MI) & Title:		Was the person trained to perform this activity/task? <input type="checkbox"/> Yes <input type="checkbox"/> No
What type of training was received (OJT, classroom, etc)?		Date of the most recent formal training and topics discussed?
3. Witness Information		
Witness #1: Name (Last, First, MI):		Job Title/Description:
Employed By:		Supervisor Name (Last, First, MI):
Witness #2: Name (Last, First, MI):		Job Title/Description:
Employed By:		Supervisor Name (Last, First, MI):
Additional Witnesses: <input type="checkbox"/> Yes <input type="checkbox"/> No (List any additional witnesses on a separate sheet and attach.)		

4. Contract Information**Type of Contract:**

- A/E BOS CLEAN Construction Design Build FSCC FSSC
 JOC RAC Service Other _____

Contract Number & Title:**Industrial Group & Industrial Type:****Prime Contractor Name/Address/Phone & Fax No:****Sub Contractor Name/Address/Phone & FAX No:****Safety Manager (Last, First, MI):****Safety Manager (Last, First, MI):****Insurance Carrier:****Insurance Carrier:****5. Accident Description****Date of Accident:****Time of Accident:****Exact Location of Accident:**

Describe the accident in detail in your words: *(Use the back of page if you need additional space)*

Direct Cause(s) of Accident:**Indirect Cause(s) of Accident:**

Action(s) taken to prevent re-occurrence or provide on-going corrective actions:	
Corrective Action Beginning Date:	Anticipated Completion Date:
Personal Protective Equipment: <input type="checkbox"/> Available and used <input type="checkbox"/> Available and not used <input type="checkbox"/> Not Required <input type="checkbox"/> Not related to Mishap <input type="checkbox"/> Wrong PPE for job List PPE Used:	
Type of Construction Equipment (Make, Model, Serial #, VIN#) Involved:	
Was Hazardous Material Spilled/Released? <input type="checkbox"/> Yes <input type="checkbox"/> No Please List Hazardous Material(s) Involved:	
Who provided first aid or cleanup of mishap site?	
Any blood-borne pathogen exposure, other than EMTs? <input type="checkbox"/> Yes <input type="checkbox"/> No Who?	
List OSHA and EM-385-1-1 standards that were violated:	
Was site secured and witness statements taken immediately? <input type="checkbox"/> Yes <input type="checkbox"/> No By Whom?	

6. Injury Illness/Fatality Information

Severity of Injury/Illness:

- | | |
|---|---|
| <input type="checkbox"/> Fatality | <input type="checkbox"/> Lost Workday Case Involving Days Away From Work |
| <input type="checkbox"/> Temporary Disability | <input type="checkbox"/> Recordable Workday Case Involving Restricted Duty |
| <input type="checkbox"/> Permanent Total Disability | <input type="checkbox"/> Other Recordable Case <input type="checkbox"/> Recordable First Aid Case |
| <input type="checkbox"/> Permanent Partial Disability | <input type="checkbox"/> Non-Recordable Case <input type="checkbox"/> No Injury |

Estimated Days Lost:

Estimated Days Hospitalized:

Estimated Days Restricted Duty:

List Primary Body Part Affected:

List Other Body Part(s) Affected:

Nature of Injury/Illness for Primary Body Part (Examples: Amputation, Burn, Hernia):

Type of Accident (Examples: Fall same level, Lifting, Bitten, Exerted):

Source of Accident (Examples: Crane, Carbon Monoxide, Ladder, Welding Equipment):

7. Causal Factors (Explain answers on supplementary sheet)

- | | |
|---|--|
| • Design – Design of facility, workplace, or equipment was a factor? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Inspection/Maintenance – Inspection & Maintenance procedures were a factor? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Persons Physical Condition – In your opinion, the physical condition of the person was a factor? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Operation Procedures – Operating procedures were a factor? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Job Practices – One or more job safety/health practices not being followed when the accident occurred contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Human Factors – One or more human factors, such as a person's size or strength contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Environmental Factors – Heat, cold, dust, sun, glare, etc., contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Chemical and Physical Agent Factors – Exposure to chemical agents, such as dust, fumes, mist, vapors, or physical agents such as noise, radiation, etc., contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Office Factors – Office setting such as lifting office furniture, carrying, stooping, contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Support Factors – Inappropriate tools/resources were provided to perform the task? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • PPE – Improper selection, use or maintenance of PPE contributed to the accident? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Drugs/Alcohol – In your opinion, were drugs or alcohol a factor? | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Job Hazard Analysis – The lack of an adequate (IAW-EM-385-1-1 Sec 01.A) activity hazard analysis was a contributing factor. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Job Hazard Analysis – JHA was not site specific and/or did not address the type of work/operations performed when the mishap occurred. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Management – A lack of adequate supervision contributed to the accident. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| • Management – Inadequate information was provided at pre con meeting. | <input type="checkbox"/> Yes <input type="checkbox"/> No |

8. OSHA Information			
Date OSHA was Notified:	Date(s) of Investigation:	Date of citation: <i>(Attach Copy)</i>	Dollar amount of Penalties:
9. Report Preparer			
Name (Last, First, MI):		Date of Report:	
Title:		Signature:	
Employer:			
Phone #:			

CONTRACTOR SIGNIFICANT INCIDENT REPORT (CSIR) INSTRUCTIONS

Complete Sections Appropriate to Incident (Rev. 06/02).

NOTE: THE ATTACHED CSIR FORM IS TO BE USED BY CONTRACTORS TO RECORD THE RESULTS OF THEIR ACCIDENT/INCIDENTS INVESTIGATIONS AND SHALL BE PROVIDED TO THE CONTRACTING OFFICER WITHIN THE REQUIRED TIMEFRAMES.

GENERAL. Complete a separate report for each person who was injured in the accident. A report needs to be completed for all OSHA recordable accidents, property damage in excess of \$2000.00 (This amount is for record purposes only. GOV is not required to enter property damage reports into FAIR database if it is less than \$10,000.00.), WHE accidents, or near miss/high visibility mishaps. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es), non-applicable sections shall be marked "N/A". If additional space is needed, provide the information on a separate sheet of paper and attach to the completed form.

Mark the report:

INITIAL – If this form is being used as initial notification of a Fatality or High Visibility Mishap. The initial form is due within 4 hours of a serious accident. A form marked 'Follow-up' or 'Final' is required within 5 days.

FOLLOW-UP – If you are providing additional information on a report previously submitted.

FINAL – If you are providing a completed report and expect no changes.

SECTION 1 – GENERAL INFORMATION

CONTRACTING ACTIVITY/ROICC OFFICE - Enter the name and address of the Contracting Office administering the contract under which the mishap took place (e.g. ROICC MCBH, ROICC NORFOLK, PWC GUAM, etc.).

ACCIDENT CLASSIFICATION - INJURY/ILLNESS/FATALITY/PROPERTY DAMAGE/-PROCEDURAL ISSUES/-ENVIRONMENTAL/LESSONS LEARNED/OTHER – Mark the appropriate block(s) if the incident resulted in any of these conditions.

INVOLVING - If the mishap involved any of the conditions listed under "Involving" mark the appropriate box(es). Specific questions associated with each of these conditions are available from the Contracting Officer to assist you in your investigation. When these questions are used they shall be attached as part of this report.

SECTION 2 - PERSONAL INFORMATION

NAME - Enter last name, first name, middle initial of person involved.

AGE - Enter age.

SEX - Enter M for Male and F for Female.

JOB TITLE/DESCRIPTION - Enter the job title/description assigned to the injured person (e.g. carpenter, laborer, surveyor, etc.).

EMPLOYED BY - Enter employment company name of the person involved.

SUPERVISOR'S NAME & TITLE - Enter name and title of the immediate supervisor.

WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? - For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

TYPE OF TRAINING - Indicate the specific type of training (classroom or on-the-job) that the injured person received before the accident happened.

DATE OF MOST RECENT FORMAL TRAINING/TOPICS DISCUSSED - Enter the month, day, and year of the last *formal* training completed that covered the activity/task being performed at the time of the accident. List topics that were discussed at the training identified above.

SECTION 3 - WITNESS INFORMATION

The following applies to Witness #1 and Witness #2:

WITNESS NAME - Enter last name, first name, middle initial of the witness.

JOB DESCRIPTION/TITLE - Enter the job title/description assigned to the witness (e.g. carpenter, laborer, surveyor, etc.).

EMPLOYED BY - Enter the name of the employment company of the witness.

SUPERVISORS NAME - Enter name of immediate supervisor of the witness.

ADDITIONAL WITNESSES - Provide same information, as above, for each witnesses. Use additional pages if necessary.

SECTION 4 - CONTRACTOR INFORMATION

TYPE OF CONTRACT - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

CONTRACT NUMBER/TITLE - Enter complete contract number and title of prime contract (e.g. N62477-85-C-0100, 184 Pearl City Hsg. Revitalization).

CONSTRUCTION INDUSTRIAL GROUP AND INDUSTRIAL TYPE – This is the type of construction that will be done at this project.

1. First, you must choose the Industrial Group. You have 4 choices to choose from: (**NOTE!** Review of the Industrial Types below and knowing what the projects scope of work is will assist you in deciding what the Industrial Group should be.)

- a. Buildings
- b. Heavy Industrial
- c. Infrastructure
- d. Light Industrial

2. Once you have chosen the Industrial Group, you now select the Industrial Type. You have multiple choices under each Group, chose the one you feel fits the project most closely because on most projects there won't be an exact match:

a. Buildings:

- (1) Communications Ctr.
- (2) Dormitory/Hotel
- (3) High-rise Office
- (4) Hospital
- (5) Housing
- (6) Laboratory
- (7) Low-rise Office
- (8) Maintenance Facility
- (9) Parking Garage
- (10) Physical Fitness Ctr.
- (11) Restaurant/Nightclub
- (12) School
- (13) Warehouse

b. Heavy Industrial:

- (1) Chemical Mfg.
- (2) Electrical (Generating)
- (3) Environmental
- (4) Metals Refining/Processing
- (5) Mining
- (6) Natural Gas Processing
- (7) Oil Exploration/Production
- (8) Oil Refining
- (9) Pulp and Paper

c. Infrastructure:

- (1) Airport
- (2) Electrical Distribution
- (3) Flood Control
- (4) Highway
- (5) Marine Facilities
- (6) Navigation
- (7) Rail
- (8) Tunneling
- (9) Water/Wastewater

d. Light Industrial:

- (1) Automotive Assembly/Mfg.
- (2) Consumer Products Mfg.
- (3) Foods
- (4) Microelectronics Mfg.
- (5) Office Products Mfg.
- (6) Pharmaceuticals Mfg.

CONTRACTOR'S NAME/ADDRESS/PHONE NUMBER

- (1) PRIME - Enter the exact name (title of firm), address, phone and fax numbers of the prime contractor.
- (2) SUBCONTRACTOR - Enter the exact name, address, phone and fax numbers of any subcontractor involved in the accident.

SAFETY MANAGER'S NAME

- (1) PRIME - Enter the name of the prime contractor safety manager.
- (2) SUBCONTRACTOR - Enter the name of the subcontractors safety manager.

INSURANCE CARRIER

- (1) PRIME - Enter the exact name/title of the prime's insurance company. Policy number not required.
- (2) SUBCONTRACTOR - Enter the exact name of the subcontractor's insurance company. Policy number not required.

SECTION 5 - ACCIDENT DESCRIPTION

DATE OF ACCIDENT - Enter the month, day, and year of accident.

TIME OF ACCIDENT - Enter the local time of accident in military time. Example: 14:30 hrs (not 2:30 p.m.).

EXACT LOCATION OF ACCIDENT - Enter facts needed to locate the accident scene (installation/project name, building/room number, street, direction and distance from closest landmark, etc.).

DESCRIBE THE ACCIDENT IN DETAIL. Fully describe the accident in the space provided. If property damage involved, give estimated dollar amount of damage and/or repair costs involved. If additional space is needed continue on a separate sheet and attach to this report. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Ensure questions below regarding direct cause(s), indirect cause(s), and actions taken are answered. **NOTE!** Review questions in Section 7 below before completing.

DIRECT CAUSE(S) - The direct cause is that single factor which most directly lead to the accident. See examples below.

INDIRECT CAUSE(S) - Indirect cause are those factors, which contributed to, but did not directly initiate the occurrence of the accident.

Examples for Direct and Indirect Cause:

1. Employee was dismantling scaffold and fell 12 feet from unguarded opening.

Direct cause: Failure to provide fall protection at elevation

Indirect causes: Failure to enforce safety requirements: improper training/motivation of employee (possibility that employee was not knowledgeable of fall protection requirements or was lax in his attitude toward safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

2. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by contractor vehicle. (note contractor vehicles was in proper safe working condition.)

Direct cause: Failure of contractor driver to maintain control of and stop contractor vehicle within safe distance.

Indirect cause: Failure of employee to pay attention to driving (defensive driving).

ACTION(S) TAKEN TO PREVENT RE-OCCURRENCE OR PROVIDE ON-GOING CORRECTIVE ACTIONS. Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on back or additional sheets of paper if necessary to fully explain and attach to the complete report form.

CORRECTIVE ACTION DATES -

(1) Beginning - Enter the date when the corrective action(s) identified above will begin.

(2) Anticipated Completion - Enter the date when the corrective action(s) identified above will be completed.

PERSONAL PROTECTIVE EQUIPMENT (PPE) - Mark appropriate box(es) and list PPE which was being used by the injured person at the time of the accident (e.g. protective clothing, shoes, glasses, goggles, respirator, safety belt, harness, etc.)

TYPE OF CONTRACTOR EQUIPMENT - Enter the Serial Number, Model Number and specific type of equipment involved in the mishap (e.g. dump truck (off highway), crane (rubber tire), pump truck (concrete), etc.).

WAS HAZARDOUS MATERIAL SPILLED/RELEASED? - Mark appropriate block and list name(s) of any reportable quantities of hazardous materials spilled/released during the mishap.

WHO PROVIDED FIRST AID OR CLEAN-UP OF MISHAP SITE? - List name(s) of individual(s) and employer, if known.

ANY BLOOD-BORNE PATHOGEN EXPOSURE, OTHER THAN EMT? - Mark appropriate block and list name(s) of individual(s) and employer, if known.

LIST OSHA AND/OR EM 385-1-1 STANDARDS THAT WERE VIOLATED. - Self explanatory.

WAS SITE SECURED AND WITNESS STATEMENT TAKEN IMMEDIATELY? - Mark appropriate block and list by whom.

SECTION 6 - INJURY/ILLNESS/FATALITY INFORMATION

SEVERITY OF INJURY/ILLNESS - Mark appropriate box.

ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work. Update when final data is known.

ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized. Update when final data is known.

ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties. Update when final data is known.

BODY PART(S) AFFECTED - Enter the most appropriate primary and when applicable, secondary, etc. body part(s) affected (e.g. arm: wrist: abdomen: single eye; jaw : both elbows: second finger: great toe: collar bone: kidney, etc.).

NATURE OF INJURY/ILLNESS FOR PRIMARY BODY PART - Enter the most appropriate nature of injury/illness (e.g. amputation, back strain, dislocation, laceration, strain, asbestosis, food poisoning, heart conditions, etc.).

TYPE AND SOURCE OF INJURY/ILLNESS - Type and Source Codes are used to describe what caused the incident.

(1) TYPE Code stands for an "Action" (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Type Code: Fell different levels".) Select the most appropriate Type of injury from the list below:

TYPE OF INJURY/ILLNESS

STRUCK BY/AGAINST	CONTACTED CONTACTED WITH (INJURED PERSON MOVING) CONTACTED BY (OBJECT WAS MOVING)
FELL, SLIPPED, TRIPPED SAME LEVEL/DIFFERENT LEVEL/NO FALL	EXERTED LIFTED, STRAINED BY (SINGLE ACTION) STRESSED BY (REPEATED ACTION)
CAUGHT ON/IN/BETWEEN	EXPOSED INHALED/INGESTED/ABSORBED/EXPOSED TO
PUNCTURED, LACERATED PUNCTURED BY/CUT BY/STUNG BY/BITTEN BY	TRAVELING IN

(2) SOURCE Code stands for an "object or substance." (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Source Code: "Ladder".) Select the most appropriate Source of injury from the list below:

SOURCE OF INJURY/ILLNESS

<p>BUILDING OR WORKING AREA WALKING/WORKING AREA STAIRS/STEPS LADDER FURNITURE BOILER/PRESSURE VESSEL EQUIPMENT LAYOUT WINDOWS/DOORS ELECTRICITY</p>	<p>DUST, VAPOR, ETC. DUST (SILICA, COAT, ETC.) FIBERS ASBESTOS GASES CARBON MONOXIDE MIST, STEAM, VAPOR, FUME WELDING FUMES PARTICLES (UNIDENTIFIED)</p>
<p>ENVIRONMENT CONDITION TEMPERATURE EXTREME (INDOOR) WEATHER (ICE, RAIN, HEAT, ETC.) FIRE, FLAME, SMOTE (NOT TABACCO) NOISE RADIATION LIGHT VENTILATION TOBACCO SMOKE STRESS (EMOTIONAL) CONFINED SPACE</p>	<p>CHEMICAL, PLASTIC, ETC. DRY CHEMICAL - CORROSIVE DRY CHEMICAL - TOXIC DRY CHEMICAL - EXPLOSIVE DRY CHEMICAL - FLAMMABLE LIQUID CHEMICAL - CORROSIVE LIQUID CHEMICAL - TOXIC LIQUID CHEMICAL - EXPLOSIVE LIQUID CHEMICAL - FLAMMABLE PLASTIC WATER MEDICINE</p>
<p>MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANICAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT</p>	<p>INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES</p>
<p>MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANICAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT</p>	<p>INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES</p>
<p>VEHICLE AS DRIVER OF PRIVATELY OWNED, RENTAL VEH. AS PASSENGER OF PRIVATELY OWNED, RENTAL VEH. DRIVER OF GOVERNMENT VEHICLE PASSENGER OF GOVERNMENT VEHICLE COMMON CARRIER (AIRLINE, BUS, ETC.) AIRCRAFT (NOT COMMERCIAL) BOAT, SHIP, BARGE</p>	<p>ANIMATE OBJECT DOG OTHER ANIMAL PLANT INSECT HUMAN (VIOLENCE) HUMAN (COMMUNICABLE DISEASE) BACTERIA, VIRUS (NOT HUMAN CONTACT)</p>
<p>MATERIAL HANDLING EQUIPMENT EARTHMOVER (TRACTOR, BACKHOE, ETC.) CONVEYOR (FOR MATERIAL AND EQUIPMENT) ELEVATOR, ESCALATOR, PERSONNEL HOIST HOIST, SLING CHAIN, JACK CRANE FORKLIFT HANDTRUCK, DOLLY</p>	<p>PERSONAL PROTECTIVE EQUIPMENT PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES RESPIRATOR, MASK DIVING EQUIPMENT SAFETY BELT, HARNESS PARACHUTE</p>

SECTION 7 - CAUSAL FACTORS

Review thoroughly. Answer each question by marking the appropriate block. **NOTE!** If any answer is yes, explain in section 5 above.

- (1) **DESIGN** - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?
- (2) **INSPECTION/MAINTENANCE** - Did inadequately or improperly maintained equipment, tools, workplace, etc., create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?
- (3) **PERSONS PHYSICAL CONDITION** - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was overexertion a factor?
- (4) **OPERATION PROCEDURES** - Did lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) **JOB PRACTICES** - Were any of the provision of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) **HUMAN FACTORS** - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person: i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach strengths, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) **ENVIRONMENTAL FACTORS** - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun temperature changes, wind, tides, floods, currents, terrain; dust, mud, glare, pressure changes, lighting, etc., play a part in the accident?

(8) **CHEMICAL AND PHYSICAL AGENT FACTORS** - Did exposure to chemical agents (either single shift exposure or long-term exposure such as dusts, fibers, (asbestos, etc.), silica, gases (carbon, monoxide, chlorine, etc.), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) **OFFICE FACTORS** - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) **SUPPORT FACTORS** - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized and adequate to provide proper tools, equipment, personnel, site preparation, etc.

(11) **PERSONAL PROTECTIVE EQUIPMENT** - Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) **DRUGS/ALCOHOL** - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

(13) **JOB/ACTIVITY HAZARD ANALYSIS** - Was a written Job/Activity Analysis completed for the task being performed at the time of the accident? If one was made, did it address the hazard adequately or does it need to be updated? If none made, will one be made? These may also need to be addressed in the Corrective Actions Taken section. Mark the appropriate box. If one was made, attach a copy of the analysis to the report.

(14) **MANAGEMENT** - Did the lack of supervisor or management support play a part in the mishap? Mark the appropriate box.

SECTION 8 - OSHA INFORMATION - Complete this section if applicable

SECTION 9 - REPORT PREPARER

Providing a completed CSIR to the Contracting Officer is the **PRIME CONTRACTOR'S RESPONSIBILITY**. Enter the name, date of report, title, employer, phone number and signature of person completing the accident report and provide it to the Contracting Officer, or his representative, responsible for oversight of that contractor activity. **NOTE!** If prepared by other than the Prime Contractor, a person employed by the Prime Contractor must sign that they have reviewed and concur with the report and it's findings (e.g. company owner, project supervisor/foreman, Safety Officer, etc.).

APPENDIX B
SAMPLING AND ANALYSIS PLAN

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-06-D-2201
CTO No. 0008

APPENDIX B
FINAL
SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)
August 22, 2006

RADIOLOGICAL SURVEY AT
IR SITE 32 AND THE SHORELINES OF IR SITES 1 AND 2
ALAMEDA POINT
ALAMEDA, CALIFORNIA

DCN: ECSD-RACIV-06-0406



TETRATECH EC, INC.

1230 Columbia Street, Suite 750
San Diego, CA 92101

Vince Richards

Vince Richards, R.G., C.E.G.
Registered Geologist

8/23/06

Date

Mary Schneider for

Mary Schneider
QC Program Manager

8/23/06

Date

Narciso A. Ancog

Narciso A. Ancog
NAVFAC SW Quality Assurance Officer

8/23/2006

Date

DISTRIBUTION LIST

This document will be distributed to the following project participants once all approval signatures have been received:

Title	Name and Contact Information
DON Remedial Project Manager (RPM)	Mr. Andrew Baughman Naval Facilities Engineering Command, Southwest 1220 Pacific Highway San Diego, CA 92132-5190 (619) 532-0902 andrew.baughman@navy.mil
DON Quality Assurance Officer (QAO)	Mr. Narciso A. Ancog, Code EVR.NA Naval Facilities Engineering Command, Southwest 1220 Pacific Highway San Diego, CA 92132-5190 (619) 532-3046 narciso.ancog@navy.mil
Radiological Affairs Support Office (RASO)	Mr. Matthew Slack Radiological Affairs Support Office Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260 (757) 256-1414 matthew.slack@navy.mil
TtEC Project Manager	Mr. Abram Eloskof Tetra Tech EC, Inc. 1940 E. Deere Ave, Suite 200 Santa Ana, CA 92705 (949) 756-7521 (714) 620-5530 (cellular) abram.eloskof@tteci.com
TtEC Program QC Manager	Ms. Mary Schneider Tetra Tech EC, Inc. 1940 E. Deere Ave, Suite 200 Santa Ana, CA 92705 (949) 756-7586 mary.schneider@tteci.com

TABLE OF CONTENTS

	PAGE
LIST OF TABLES.....	B.v
LIST OF FIGURES	B.v
ABBREVIATIONS AND ACRONYMS	B.vi
ELEMENTS OF EPA QA/R-5 IN RELATION TO THIS SAP	B.ix
1.0 INTRODUCTION	B.1-1
1.1 OBJECTIVES	B.1-1
1.2 REGULATORY OVERSIGHT	B.1-2
2.0 BACKGROUND	B.2-1
3.0 MAPS.....	B.3-1
4.0 SAMPLING STRATEGY	B.4-1
4.1 SOIL SAMPLING FOR IR SITE 32, THE SHORELINES OF IR SITES 1 AND 2, AND THE RADIOLOGICAL SHACK AREA WITHIN IR SITE 2	B.4-1
4.2 WASTE CHARACTERIZATION SAMPLING	B.4-2
5.0 REQUEST FOR ANALYSIS	B.5-1
5.1 ANALYTICAL METHODS.....	B.5-1
5.2 SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES	B.5-1
5.3 FIELD QUALITY CONTROL SAMPLES	B.5-1
5.3.1 Field Duplicates	B.5-2
5.3.2 Equipment Rinsate Samples	B.5-2
5.3.3 Source Blank Samples	B.5-2
6.0 FIELD METHODS AND SAMPLING PROCEDURES.....	B.6-1
6.1 SOIL SAMPLING PROCEDURES.....	B.6-1
6.2 WASTE CHARACTERIZATION SAMPLING PROCEDURES	B.6-2
6.2.1 Waste Sampling Procedures	B.6-2
6.3 DECONTAMINATION PROCEDURES.....	B.6-2
6.4 SAMPLE NUMBER	B.6-4
6.5 SAMPLE LABELING	B.6-4
6.6 SAMPLE PACKAGING AND SHIPMENT	B.6-4
6.7 FIELD DOCUMENTATION.....	B.6-6
6.7.1 Chain-of-custody.....	B.6-6
6.7.2 Custody Seals.....	B.6-7
6.7.3 Field Logbooks	B.6-7
6.7.4 Document Corrections	B.6-8

TABLE OF CONTENTS

(Continued)

	PAGE
7.0 PROJECT ORGANIZATION	B.7-1
7.1 POINTS OF CONTACT	B.7-1
8.0 QUALITY ASSURANCE OBJECTIVES	B.8-1
8.1 DATA QUALITY OBJECTIVES.....	B.8-1
8.2 ANALYTICAL DATA QUALITY OBJECTIVES.....	B.8-1
8.2.1 Quality Control Criteria.....	B.8-1
8.2.2 Project Reporting Limits.....	B.8-3
8.2.3 Project Quality Control Limits.....	B.8-3
9.0 ANALYTICAL QUALITY CONTROL PROCEDURES	B.9-1
9.1 LABORATORY QUALIFICATION.....	B.9-1
9.2 LABORATORY SAMPLE CUSTODY AND DOCUMENTATION	B.9-1
9.2.1 Corrections to Custody Documentation.....	B.9-2
9.3 LABORATORY QUALITY CONTROL PROCEDURES	B.9-2
9.4 LABORATORY QUALITY CONTROL SAMPLES	B.9-2
9.4.1 Calibration.....	B.9-2
9.4.2 Instrument/Calibration Blanks (applicable to chemical analyses only)...	B.9-3
9.4.3 Method Blanks	B.9-3
9.4.4 Laboratory Control Samples	B.9-3
9.4.5 Matrix Spike and Matrix Spike Duplicate	B.9-4
9.4.6 Duplicates	B.9-4
9.5 PREVENTIVE MAINTENANCE	B.9-4
9.6 DATA REVIEW	B.9-5
9.6.1 Analyst Review	B.9-5
9.6.2 Peer Review	B.9-5
9.6.3 Technical Review.....	B.9-5
9.6.4 Management Review	B.9-6
9.6.5 Quality Assurance Review.....	B.9-6
9.7 DELIVERABLES	B.9-6
9.7.1 Hard-copy Deliverables	B.9-6
9.7.2 Electronic Deliverables.....	B.9-8
10.0 DATA QUALITY MANAGEMENT	B.10-1
10.1 DATA MANAGEMENT	B.10-1
10.1.1 Hard-copy Report.....	B.10-1
10.1.2 Electronic Data.....	B.10-1
10.2 DATA VALIDATION.....	B.10-1
10.3 DATA EVALUATION.....	B.10-2

TABLE OF CONTENTS

(Continued)

	PAGE
11.0 QUALITY ASSURANCE OVERSIGHT	B.11-1
11.1 FIELD AUDITS	B.11-1
11.1.1 Corrective Action.....	B.11-1
11.2 LABORATORY AUDITS	B.11-1
11.2.1 Corrective Action.....	B.11-2
12.0 SAP REVISION OR AMENDMENT	B.12-1
13.0 REFERENCES	B.13-1

LIST OF TABLES

Table B.5-1	Sample Containers, Preservatives, and Holding Time Requirements
Table B.7-1	Personnel and Responsibilities
Table B.8-1	Summary of Data Quality Objectives
Table B.8-2	Proposed Reporting Limits
Table B.8-3	Quality Control Acceptance Criteria

LIST OF FIGURES

Figure B.1-1	Site Vicinity Map
Figure B.1-2	Radiological Survey Areas
Figure B.7-1	Project Organization Chart

ABBREVIATIONS AND ACRONYMS

°C	degrees Celsius
µg/L	micrograms per liter
%R	percent recovery
bgs	below ground surface
BHC	benzene hexachloride
BRAC	Base Realignment and Closure
CCV	continuing calibration verification
cm ²	square centimeters
COC	chain-of-custody
CTO	Contract Task Order
DCBP	decachlorobiphenyl
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DHS	California Department of Health Services
DoD	Department of Defense
DOE	Department of Energy
DON	Department of the Navy
DOT	Department of Transportation
dpm	disintegrations per minute
DQO	Data quality objectives
DTSC	California Department of Toxic Substances Control
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
EWI	Environmental Work Instruction
GC/MS	gas chromatograph/mass spectrometer
HCl	hydrochloric acid
HDPE	high-density polyethylene
HNO ₃	nitric acid
IATA	International Air Transport Association
ICAL	Initial calibration
ICP-AES	inductively coupled plasma-atomic emission spectrometer

ABBREVIATIONS AND ACRONYMS

(Continued)

IR	Installation Restoration
L	liter
LBGR	lower boundary of the gray region
LCS	laboratory control sample
m ²	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MEK	methyl ethyl ketone
MIBK	methyl isobutyl ketone
mL	milliliter
MS/MSD	matrix spike/matrix spike duplicate
MTBE	methyl tert-butyl ether
N/A	not applicable
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NFESC	Naval Facilities Engineering Service Center
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
pCi/g	picocurie per gram
pCi/L	picocurie per liter
PESM	Project Environmental and Safety Manager
PHP	Project Health Physicist
PjM	Project Manager
PQCM	Project Quality Control Manager
QA	quality assurance
QC	quality control
RAC	Remediation Action Contract
²²⁶ Ra	radium-226
RASO	Radiological Affairs Support Office
RL	reporting limit
ROICC	Resident Office in Charge of Construction
RPD	relative percent difference
RPM	Remedial Project Manager

ABBREVIATIONS AND ACRONYMS

(Continued)

SAP	Sampling and Analysis Plan
SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
SVOC	semivolatile organic compound
⁹⁰ Sr	strontium-90
TCMX	tetra chloro-meta-xylene
TtEC	Tetra Tech EC, Inc.
TtFW	Tetra Tech FW, Inc.
USFWS	United States Fish and Wildlife Service
UXO	Unexploded Ordnance
VOA	volatile organic analysis
VOC	volatile organic compound

ELEMENTS OF EPA QA/R-5 IN RELATION TO THIS SAP

EPA QA/R-5 QAPP Element ^a	Tetra Tech EC, Inc. SAP
A1 Title and Approval Sheet	Title and Approval Sheet
A2 Table of Contents	Table of Contents
A3 Distribution List	Distribution List
A4 Project/Task Organization	7.0 Project Organization
A5 Problem Definition/Background	2.0 Background
A6 Project/Task Description	1.1 Objectives
A7 Quality Objectives and Criteria	8.0 Quality Assurance Objectives
A8 Special Training/Certification	10.2 Data Validation
A9 Documents and Records	10.0 Data Quality Management
B1 Sample Process Design	4.0 Sampling Strategy
B2 Sampling Methods	6.0 Field Methods and Sampling Procedures
B3 Sample Handling and Custody	6.6 Sample Packaging and Shipment and 9.2 Laboratory Sample Custody and Documentation
B4 Analytical Methods	5.0 Request for Analysis
B5 Quality Control	5.3 Field Quality Control Samples 9.0 Analytical Quality Control Procedures
B.6 Instrument/Equipment Testing, Inspection, and Maintenance	9.5 Preventative Maintenance
B7 Instrument/Equipment Calibration and Frequency	9.4.1 Calibration
B8 Inspection/Acceptance of Supplies and Consumables	10.1.1 Hard-copy Report
B9 Non-Direct Measurements	10.1.2 Electronic Data
B10 Data Management	10.1 Data Management
C1 Assessment and Response Actions	11.0 Quality Assurance Oversight
C2 Reports to Management	11.0 Quality Assurance Oversight
D1 Data Review, Verification, and Validation	9.6 Data Review 10.3 Data Evaluation
D2 Verification and Validation Methods	10.2 Data Validation
D3 Reconciliation with User Requirements	Table B.8-1 Summary of Data Quality Objectives

Notes:

^a EPA. 2001. *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS*. March.
 EPA – U.S. Environmental Protection Agency
 QA – quality assurance
 QAPP – Quality Assurance Project Plan
 SAP – Sampling and Analysis Plan

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared for the Department of the Navy (DON) by Tetra Tech EC, Inc. (TtEC) under the Naval Facilities Engineering Command, Southwest (NAVFAC SW), Remediation Action Contract (RAC) IV No. N62473-06-D-2201, Contract Task Order (CTO) No. 0008. The purpose of the SAP is to provide guidance on sampling, analysis, and quality assurance (QA) for specific sampling activities pertaining to the radiological survey at Installation Restoration (IR) Site 32 and the shorelines of IR Sites 1 and 2. In 2004, TtEC conducted a radiological characterization survey at IR Sites 1 and 2. However, due to accessibility issues, neither the shorelines of IR Site 1 and 2 nor the former Radiological Shack area located within IR Site 2 were surveyed. During the radiological survey of IR Site 1, an elevated radiological reading was identified on the eastern boundary, which borders IR Site 32. The sampling and radiological survey described in this plan will be conducted to fill these data gaps. Figures B.1-1 and B.1-2 show the site location and areas to be surveyed, respectively.

This SAP will be used as a reference document by all field and laboratory personnel engaged in this program. Included in this SAP are field sampling procedures, QA/quality control (QC) requirements, and data gathering methods that will be used during this project. Data quality objectives (DQOs) for the field sampling are also provided in this document. The QA elements of this SAP were prepared in accordance with the *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS* (U.S. Environmental Protection Agency [EPA], 2001) to ensure that all data collected are precise, accurate, representative, complete, and comparable to meet their intended use.

1.1 OBJECTIVES

The objective of the radiological surveys is to conduct radiological characterization surveys at IR Site 32, the shorelines of IR Sites 1 and 2, and the Radiological Shack area in IR Site 2 in accordance with the *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (Department of Defense [DoD] et al., 2000). The intent is to perform a characterization survey such that if no radiological contamination is discovered, then the data can be used to support the Final Status Survey. However, if radiological contamination is discovered, then the data will be used to determine areas for future removal action at the sites.

The objectives of this SAP are to: 1) provide guidance for the field sampling activities; 2) describe and establish consistent field sampling procedures; 3) establish data gathering, handling, and documentation methods; and 4) define QA/QC measures to ensure consistency and confidence in the data obtained.

The sampling objectives are to collect samples for the following:

- Soil samples from biased locations within IR Site 32, the shorelines of IR Sites 1 and 2, and the Radiological Shack area in IR Site 2 survey areas. This analytical data will be used to determine the existing condition of the sites and will be used to evaluate potential remedial alternatives.
- Waste characterization sampling of wastewater generated during field activities.

1.2 REGULATORY OVERSIGHT

The DON is the lead agency responsible for the radiological survey with oversight from the EPA, the lead federal regulatory agency. The California Department of Toxic Substances Control (DTSC) will provide state regulatory oversight. The United States Fish and Wildlife Service (USFWS) will provide guidance to the DON on wildlife and wetland issues.

2.0 BACKGROUND

Site location (Figure B.1-1) and background information are detailed in Section 2.0 of the Radiological Survey Work Plan for IR Site 32 and the Shorelines of IR Sites 1 and 2 and will not be duplicated here.

3.0 MAPS

Figures relevant to the site location are as follows:

- Figure B.1-1, Site Vicinity Map
- Figure B.1-2, Radiological Survey Areas

4.0 SAMPLING STRATEGY

This section provides a brief description of the approach that will be used to collect samples for the radiological survey at IR Site 32, the shorelines of IR Sites 1 and 2, and the Radiological Shack area in IR Site 2.

4.1 SOIL SAMPLING FOR IR SITE 32, THE SHORELINES OF IR SITES 1 AND 2, AND THE RADIOLOGICAL SHACK AREA WITHIN IR SITE 2

During previous radiological surveys at IR Sites 1 and 2, the Radiological Affairs Support Office (RASO) determined that 15 soil samples were adequate to characterize the soil at IR Sites 1 and 2. For consistency, the DON determined that up to 15 biased samples and two field duplicate samples will be collected to meet the objectives of the characterization survey between all four sites (IR Site 1 and 2 shoreline areas, IR Site 32, and the Radiological Shack area in IR Site 2) (Figure B.1-2). The sample locations will be determined based on the surface scan survey data of all four sites and approval from the RASO. Surface scan survey is described in Sections 7.3.1 and 7.3.2 of the Radiological Survey Work Plan. A background count rate will be established for each detector by scanning the selected reference areas identified in Section 7.1 of the Radiological Survey Work Plan. The surface scan may include a step-out procedure if an anomalous location is identified at the southern or eastern edge of the IR Site 32 boundary. Step-out procedures are not applicable to IR Sites 1 and 2 since the remaining portions of these sites were previously surveyed. At the location of the anomaly, the survey will step 10 feet outside the current boundary in each direction to identify any discrete sources. If an additional anomaly is identified within this area, the survey area will be extended in 10-foot increments until no further anomalies are encountered. Therefore, the biased sampling locations may include step-out locations. Static surveys will be performed at each soil sampling location, as described in Section 7.3.3 of the Radiological Survey Work Plan.

Sampling will be conducted by using a hand-auger to collect a sample from zero to 20 inches below ground surface (bgs) at each location. Sampling procedures for the collection of samples are detailed in Section 6.1 of this SAP. Soil samples will be sent to an off-site laboratory for radiological analysis. Each sample will be homogenized by the laboratory and analyzed by gamma spectroscopy for radiological isotopes. Per RASO's recommendation, five of the 15 soil samples will be selected and then approved by the RASO for analysis of strontium-90 (90Sr). The five soil samples with the highest readings from the survey scan will be analyzed for 90Sr.

The background soil concentration of radium-226 (226Ra) (0.365 picocurie per gram [pCi/g]) was determined during the IR Sites 1 and 2 land area survey performed in 2004 (Tetra Tech FW, Inc. [TtFW], 2005a; TtFW, 2005b). This concentration will be used to determine if 226Ra is present in soil samples at concentrations greater than 3 sigma above background (0.559 pCi/g).

Locations where activity has been determined to be above this level shall be marked for possible further investigation.

Prior to collecting the soil samples, each biased sample location will be checked and cleared for unexploded ordnance and underground obstructions such as underground piping and lines. If a selected sample location cannot be cleared, then a new sample location will be selected nearby.

No radiological survey or sampling will be conducted in concrete runways or where there are permanent facilities.

4.2 WASTE CHARACTERIZATION SAMPLING

Wastes generated during site activities that will require sampling include wastewater from decontamination. Decontamination wastewater generated during field activities will be stored on site in drums prior to sampling for disposal. One water sample per drum will be collected and analyzed, at a minimum, for gamma spectroscopy, ⁹⁰Sr, volatile organic compounds (VOCs), organochlorine pesticides, polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), and metals including mercury.

Additional analyses may be added based on disposal facility requirements. Waste characterization sampling procedures are detailed in Section 6.2 of this SAP.

5.0 REQUEST FOR ANALYSIS

This section describes the analytical methods, sample containers, and preservative requirements. Additionally, field QC samples to be collected for this project will be discussed in this section.

5.1 ANALYTICAL METHODS

The following EPA analytical methods from *Gamma Emitting Radionuclides by Gamma Ray Spectrometry, Prescribed Procedures for Measurement of Radioactivity in Drinking Water* including updates (EPA, 1980) and *Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846*, Third Edition and final updates (EPA, 1986) will be used to analyze samples during this project:

Soil Samples

- Gamma Spectroscopy by EPA Method 901.1M (modified for soil) or equivalent
- ⁹⁰Sr by Department of Energy (DOE) Sr-01/Sr-02 or equivalent

Water Samples (For waste characterization purposes)

- Gamma spectroscopy by EPA Method 901.1 or equivalent
- ⁹⁰Sr by EPA Method 905.0 or equivalent
- VOCs by EPA Method 8260B
- SVOCs by EPA Method 8270C
- Pesticides by EPA Method 8081A
- PCBs by EPA Method 8082
- Metals by EPA Method 6010B/6020/7470A

5.2 SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

A list of the sample containers, preservatives, and holding time requirements for each analytical method is provided in Table B.5-1.

5.3 FIELD QUALITY CONTROL SAMPLES

Field QC samples will be collected and analyzed during the project to assess the consistency and performance of the sampling program. Field QC samples for this project may include field duplicates, equipment rinsates, and source blanks. Trip blanks will not be collected for this project as VOC analysis is only being conducted on waste characterization samples, and field QC samples are not applicable to the collection of waste characterization samples.

5.3.1 Field Duplicates

Field duplicates consist of two samples (an original and a duplicate) of the same matrix collected at the same time and location, to the extent possible, and using the same sampling techniques. Field duplicates for soil samples will be collected at a rate of one sample for every 10 regular samples and will be analyzed for the same analytes as the original sample. Field duplicates are uniquely identified so that the identity of the field duplicates is “blind” to the analytical laboratory. Exact locations of field duplicate samples and their identifications will be recorded in the field logbook.

5.3.2 Equipment Rinsate Samples

Equipment rinsate samples will be collected only if reusable sampling equipment is used. Rinsate samples consist of organic-free, reagent-grade water collected from the final rinse of the equipment decontamination process. Rinsate samples will be collected directly from the sampling equipment, placed in appropriate pre-cleaned containers supplied by the analytical laboratory, and analyzed for the same analytes as the field samples under the same analytical conditions. Equipment rinsate samples, collected at a frequency of one per each day of sampling, will help determine the effectiveness of the decontamination procedure and potential for cross-contamination during sampling events. Equipment rinsates, at minimum, will be analyzed for gamma spectroscopy and ^{90}Sr .

5.3.3 Source Blank Samples

A source blank consists of analyte-free, reagent-grade water provided by the laboratory to be used for the collection of equipment rinsate samples as described in Section 5.3.2. Source blank samples will only be collected if equipment rinsate samples are collected.

In order to ensure that the source blank water is free of contamination, one of two courses of action will be followed before the source blank water is used. First, the laboratory will be asked to provide a certificate of analysis with each batch/lot of source blank water to confirm that the results are not above the project reporting limits (RLs) discussed in Section 8.2.2. If the laboratory cannot provide a certificate of analysis for each batch/lot, then a sample will be collected for each batch of water delivered and analyzed for the same parameters as the equipment rinsate sample to verify that the results are not above the project RLs.

6.0 FIELD METHODS AND SAMPLING PROCEDURES

The following sections provide the sampling procedures and sample handling protocols to be used for this project.

6.1 SOIL SAMPLING PROCEDURES

Soil sample locations will be selected based on radiological survey results at IR Site 32, the shorelines of IR Sites 1 and 2, and the Radiological Shack area within IR Site 2 (Figure B.1-2). Soil samples will be collected from zero to 20 inches bgs as described below. The surveyor will mark each sample location with a pin flag or other marking device.

The sampling will be performed as follows:

1. Sampling personnel will don a new pair of disposable Nitrile[®] gloves immediately before collecting soil samples at each location.
2. A hand-auger will be used to collect soil at each location from zero to 20 inches bgs. All of the soil from zero to 20 inches bgs will be placed into a Marinelli beaker.
3. A completed sample label will be affixed to each Marinelli beaker and clear packing tape used to secure the sample label to the container.
4. Prior to shipment to the laboratory, each soil sample will be emptied into a plastic or aluminum tray. The soil will be screened for radiological activity using hand-held instruments and any point sources detected will be removed. The soil will then be placed back into the Marinelli beaker.
5. A custody seal will be affixed over the lid of the Marinelli beaker.
6. The Marinelli beaker will be placed in double-resealable bags.
7. The sample number, date, time, and description of the sample will be recorded on the chain-of-custody (COC) record and in the field logbook. All entries will be written in indelible black or blue ink.
8. Each sample will be numbered, labeled, and packaged in accordance with Sections 6.4 through 6.6.
9. Field documentation, including field logbooks and COC records, will be filled out in accordance with Section 6.7.
10. The hand-auger will be decontaminated in accordance with procedures in Section 6.3.

Prior to analysis, samples will be homogenized by the laboratory using the following procedures:

1. Each soil sample will be emptied into an aluminum tray.
2. The material in the tray will be divided into quarters, and each quarter will be mixed individually using plastic scoops.

3. Two quarters will then be combined to form halves.
4. The two halves will be mixed to form a homogeneous matrix.
5. The material will be folded from the bottom of the pan into the top of the pan to prevent settling of the finer-grained materials.

This procedure will be repeated several times until the samples are adequately mixed.

6.2 WASTE CHARACTERIZATION SAMPLING PROCEDURES

Wastewater will be generated during field activities and will require proper disposal. Characterization will be performed for chemical contaminants only. Radiological waste characterization will not be performed. Sampling of this material will be performed as follows.

6.2.1 Waste Sampling Procedures

Waste samples will be collected as follows:

1. Sampling personnel will don a new pair of disposable Nitrile[®] gloves immediately before collecting samples.
2. The top of the drum will be carefully opened.
3. Liquid samples will be collected using disposable bailers or similar device. Samples will be transferred from the bailers to pre-preserved, pre-cleaned sample containers using a bottom-emptying device. Samples for VOC analysis will be collected as described in Section 6.2.1.1 below.
4. Sample numbering, labeling, packaging and documentation procedures will be followed as described in Section 6.4 through Section 6.7.

6.2.1.1 Wastewater VOC Sampling Procedures

Water VOC samples will be collected as follows:

1. The water samples will be collected into 40-milliliter (mL) volatile organic analysis (VOA) vials carefully to minimize aeration.
2. The vial will be filled up to the lid until a positive meniscus is formed.
3. The vial will be capped immediately, but slowly.
4. The sample will be checked for the presence of air bubbles.
5. If an air bubble is present, the collected sample will be discarded and re-sampled using a new vial.
6. The previous steps will be repeated until an air bubble-free sample is collected.

6.3 DECONTAMINATION PROCEDURES

Decontamination of non-disposable sampling equipment will be performed to prevent the introduction of extraneous material into samples and to prevent cross-contamination between

samples. All sampling equipment will be decontaminated by steam cleaning or by washing with a nonphosphate detergent such as Liquinox® or equivalent. Decontamination water will be collected in approved Department of Transportation (DOT) containers.

The following steps will be followed for general decontamination of non-disposable sampling equipment:

1. **Wash with nonphosphate detergent and water solution** — This step will reduce the amount of gross contamination from the equipment. Use of a bucket, approximately 75 percent full of solution, is suggested for this step. This detergent solution will be prepared by diluting nonphosphate detergent in potable water as directed by the manufacturer.
2. **Rinse with potable water** — This step will rinse all the detergent solution away from equipment. Use of a bucket, approximately 75 percent full of potable water, is suggested for this step. Periodic changing of this water is required.
3. **Rinse with potable water** — Repeat Step 2. Subsequent to the final rinse, place decontaminated equipment on a clean surface (plastic sheeting) to air dry. This step will rinse the equipment of any detergent solution and potable water residues. Rinsing is most effective by applying deionized water from a stainless steel Hudson-type sprayer or Nalgene™ squeeze bottle while holding equipment over a bucket.

Radiological screening of equipment — This step will be used to decontaminate survey equipment that is to be taken off site at the completion of the work activities. The process will be completed using a hand-held survey meter in accordance with the Standard Operating Procedures (SOP) (SOP 5, Release of Materials and Equipment from Radiological Controlled Areas) provided in Appendix D of the Radiological Survey Work Plan. The following applies to the release of equipment and material:

- a) Removable contamination, determined by smearing with a dry filter:
20 disintegrations per minute (dpm)/100 square centimeters (cm²)
- b) Average, (fixed and removable) based on a maximum area of 1 square meters (m²): 100 dpm/100 cm², beta/gamma

If equipment rinse samples are to be collected, laboratory reagent-grade water will be used as an additional rinse after Step 4. Water that is falling off the sampling equipment as it is being rinsed with the reagent-grade water will be collected in appropriate sample bottles and analyzed for the same parameters as the field samples. The radiological release criteria for the decontamination water will be 5 pCi/L based on the EPA Maximum Contaminant Level for ²²⁶Ra.

6.4 SAMPLE NUMBER

Each sample will be identified as follows:

- XX: 1 to 2-character designation of the project number and CTO number (for example, 8)
- YYYY: Up to 4-character designation of the area (for example, "IR1" for IR Site 1, "IR2" for IR Site 2, "IR32" for IR Site 32, and "RSA" for Radiological Shack area)
- ZZZ: 3-character designation of the consecutive sample number (for example, 004)

For example, in the sample identification number 8-IR1-004, "8" represents the CTO number, "IR1" represents IR Site 1, and "004" represents the fourth sample collected for the project.

The sample number will be recorded in the field logbook, on the labels, and COC record at the time of sample collection. A complete description of the sample and sampling conditions will be recorded in the field logbook and referenced using the unique sample identification number.

6.5 SAMPLE LABELING

Sample labels are necessary to prevent misidentification of samples. Sample labels will be filled out in indelible black or blue ink and affixed to sample containers at the time of sample collection. Each sample label will be covered with clear tape. Each sample container will be labeled with the following, at a minimum:

- Sample identification number
- Sample collection date (month/day/year)
- Time of collection (24-hour clock)
- Sampler's initials
- Analyses required
- Preservative (if any)

6.6 SAMPLE PACKAGING AND SHIPMENT

Sample packaging and shipment procedures for this project will be in accordance with DOT/International Air Transport Association (IATA) procedures, as applicable for packaging and shipping for samples and in accordance with the following procedures.

Immediately after sample labeling, custody seals or tape will be affixed to each sample container. For VOA vials, the custody seal will be placed on the outside of the first resealable bag; then the containers will be placed in a second resealable bag. This will prevent any contact with the adhesive from the custody seal and the samples. Other sample containers will be placed in

double-resealable plastic bags to protect the samples from moisture and to prevent breakage and potential cross-contamination during transportation to the laboratory. All glass sample containers will be protected with bubble wrap first, then placed in resealable bags if transported by a commercial carrier. VOA vials should be wrapped with bubble wrap, then placed in a resealable bag, a custody seal placed over the bag, and then placed in another resealable bag.

For chemical samples, each cooler will be shipped with a temperature blank. A temperature blank is a container filled with tap water and stored in the cooler during sample collection and transportation. The temperature of the cooler will be recorded by the laboratory on the COC record immediately upon receipt of the samples. Sample cooler drain spouts will be taped from the inside and outside of the cooler to prevent any leakage. Samples transported by a laboratory-assigned courier will be packed in a sample cooler with sufficient ice to keep the samples cooled. Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. The COC record will be completed and signed by the courier. The cooler(s) and the top two copies (white and pink) of the COC record will then be released to the courier for transportation to the laboratory. Samples to be shipped by commercial carrier will be packed in a sample cooler lined with a plastic bag. Double-bagged ice will be added inside the plastic bag at the bottom of the cooler, one layer of sample containers will be placed on the ice, and more double-bagged ice will be placed on top of the containers. This will be repeated until the cooler is filled with ice as the top layer in the cooler.

The COC record will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies of the COC record will be sealed in a double-resealable bag and then taped to the inside of the sample cooler lid. The cooler will be taped shut with strapping tape. Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. Clear tape will be applied to the custody seals to prevent accidental breakage during shipment. The pouch for the airbill will be placed on the cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple coolers are being shipped, then the original airbill will be placed on the cooler with the COC record, and copies of the airbill will be placed on the other coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated with the laboratory in advance, and field sampling personnel or their designee must ensure that Saturday delivery stickers are placed on each cooler by the commercial courier. "Dangerous goods" declarations will also be completed as applicable.

Radiological samples will be packaged as described above except that ice (and therefore temperature blanks) is not required. Samples for radiological analysis may be packed in a cooler or box with sufficient packing material if samples are transported by a commercial carrier.

6.7 FIELD DOCUMENTATION

In order to maintain the integrity and traceability of samples, all information pertinent to field sampling will be recorded in a field logbook. All samples will be properly labeled and custody-sealed prior to being transported to the laboratory and will be accompanied by completed COC documentation. All documentation will be recorded in a field logbook in indelible black or blue ink.

6.7.1 Chain-of-custody

To establish the documentation necessary to trace sample possession from the time of collection through analysis and disposal, a COC record will be completely filled out and will accompany every sample. Samples will be delivered to the laboratory for analysis as soon as practical.

At a minimum, the following items will be recorded on the COC record:

- Project name
- Project location/Site ID
- Project number (3210.0008)
- Purchase order number
- Sample ID
- Sampler name
- Sampler signature
- Project contact
- Airbill number (if applicable)
- Date (of sample collection)
- Time (of sample collection to the nearest minute, 24-hour clock)
- Sample type (matrix)
- Turnaround time
- Sample location codes
- Sample depth in feet (start, end)
- QC type:
 - REG: regular sample
 - ER: equipment rinsate
 - FD: field duplicate
 - SMQC: source blank

- Composite description (if applicable)
- Laboratory name
- Number of sample containers
- Laboratory ID
- Analyses required
- Comments
 - Matrix spike/matrix spike duplicate (MS/MSD) samples
 - Observations specific to sample
- Transfer signature (to relinquish samples)
 - The sampler will be the first person to relinquish sample possession
- Courier/laboratory representative signature (for commercial carrier, record airbill number here)
- Date/time (of custody transfer)
- Laboratory instructions
- Data package requirement (Level III or IV)

6.7.2 Custody Seals

Sample custody seals are used to detect unauthorized tampering of samples from the time of sample collection to the time of analysis.

The applicable seals will be signed or initialed and dated by the sampler. The seals will be placed on the sample containers and shipping containers in such a way that they must be broken in order to open the containers. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

6.7.3 Field Logbooks

A permanently bound field logbook with consecutively numbered pages, used for sampling activities only, will be assigned to this project. All entries will be recorded in indelible black or blue ink. At the end of each workday, the logbook pages will be signed by the responsible sampler, and any unused portions of the logbook pages will be crossed out, signed, and dated.

If it is necessary to transfer the logbook to another person, the person relinquishing the logbook will sign and date the last page used, and the person receiving the logbook will sign and date the next page to be used.

At a minimum, the logbook will contain the following information:

- Project name and site location

- Date and time
- Personnel in attendance
- General weather information
- Work performed
- Field observations
- Sampling performed, including specifics such as location, type of sample, type of analyses, and sample identification
- Field analyses performed, including results, instrument checks, problems, and calibration records for field instruments
- Descriptions of deviations from this SAP
- Problems encountered and corrective action taken
- Identification of field QC samples
- QC activities
- Verbal or written instructions
- Any other events that may affect the samples

6.7.4 Document Corrections

Changes or corrections on any project documentation will be made by crossing out the erroneous item with a single line and initialing (by the person performing the correction) and dating the correction. The original item, although erroneous, must remain legible beneath the cross-out line. The new information should be written clearly above the crossed-out item.

7.0 PROJECT ORGANIZATION

This section identifies the key individuals from the DON and TtEC who are responsible for the oversight and/or implementation of the proposed field activities. The project organization chart is shown in Figure B.7-1. The responsibilities of the team members associated with the sampling activities are presented in Table B.7-1.

7.1 POINTS OF CONTACT

The following is a list of the key contacts for the project:

Agency	Contact	Project Title
NAVFAC SW 1220 Pacific Highway San Diego, CA 92132	Mr. Andrew Baughman (619) 532-0902 andrew.baughman@navy.mil	Remedial Project Manager (RPM)
NAVFAC SW 1220 Pacific Highway San Diego, CA 92132	Mr. Thomas Macchiarella (619) 532-0940 thomas.macchiarella@navy.mil	Base Realignment and Closure (BRAC) Environmental Coordinator
NAVFAC SW Caretaker Site Office – San Francisco Bay Area 410 Palm Ave., Building 1, Suite 161 San Francisco, CA 94130-1806	Mr. Doug DeLong (415) 743-4713 (510) 772-8832 (cellular) mildouglas.delong@navy.mil	BRAC Environmental Compliance Manager
NAVFAC SW 1220 Pacific Highway San Diego, CA 92132	Ms. Joyce Howell-Payne (619) 532-0923 joyce.howell-payne@navy.mil	Contract Specialist
NAVFAC SW 1220 Pacific Coast Highway San Diego, CA 92132	Mr. Narciso Ancog (619) 532-3046 narciso.ancog@navy.mil	QA Officer
NAVFAC SW 2450 Saratoga Street, Building 110, Suite 200 Alameda Point, Alameda, CA 94501-7545	Mr. Gregory Grace (510) 749-5940 gregory.grace@navy.mil	Resident Office in Charge of Construction (ROICC)
NAVFAC SW 2450 Saratoga Street, Building 110, Suite 200 Alameda Point, Alameda, CA 94501-7545	Mr. Robert Perricone (510) 749-5942 robertperricone@navy.mil	ROICC Construction Management Technician
RASO Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260	Mr. Matthew Slack (757) 256-1414 matthew.slack@navy.mil	RASO

Agency	Contact	Project Title
EPA 75 Hawthorne Street (SFD-8-2) San Francisco, CA 94105-3901	Ms. Anna-Marie Cook (415) 972-3029 cook.anna-marie@epa.gov	EPA-RPM
USFWS P.O. Box 159 Alameda, CA 94501	Rachel Hurt (510) 377-8375 rachel_hurt@fws.gov	USFWS
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Mr. Jamshid Sadeghipour (949) 756-7519 jamshid.sadeghipour@tteci.com	Deputy Program Manager
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Mr. Abram Eloskof (949) 756-7521 (714) 620-5530 (cellular) abram.eloskof@tteci.com	Project Manager (PjM)
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Ms. Mary Schneider (949) 756-7586 mary.schneider@tteci.com	QC Program Manager
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Ms. Jennifer Dessort (949) 756-7541 (949) 466-7573 (cellular) jennifer.dessort@tteci.com	Project Quality Control Manager (PQCM) and Site Health and Safety Specialist (SHSS)
TtEC 1230 Columbia Street, Suite 750 San Diego, CA 92101	Mr. Lance Humprey (619) 471-3519 (619) 988-5974 (cellular) lance.humprey@tteci.com	Unexploded Ordnance (UXO) Specialist
TtEC 1230 Columbia Street, Suite 750 San Diego, CA 92101	Mr. Roger Margotto (619) 471-3503 (714) 810-3742 (pager) roger.margotto@tteci.com	Project Environmental and Safety Manager (PESM)
TtEC 3200 George Washington Way, Suite G Richland, WA 99352-3429	Mr. Cliff Stephan (509) 371-0140 (509) 430-4655 (cellular) cliff.stephan@tteci.com	Project Health Physicist (PHP)
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Mr. Nathan Mudry (949) 756-7509 (949) 230-7847 (cellular) nathan.mudry@tteci.com	Project Biologist
TtEC 1940 E. Deere Avenue, Suite 200 Santa Ana, CA 92705	Ms. Lynn Jefferson (949) 756-7558 lynn.jefferson@tteci.com	Project Chemist

8.0 QUALITY ASSURANCE OBJECTIVES

The overall QA objectives of this SAP are to outline procedures for the collection and assessment of data that are within acceptable ranges of precision, accuracy, representativeness, completeness, and comparability (PARCC) to meet the project DQOs. The DQOs associated with environmental data are a function of the sampling plan rationale and the procedures used to collect the samples, as well as the analytical methods and instrumentation used. However, uncertainty cannot be eliminated entirely from environmental data.

8.1 DATA QUALITY OBJECTIVES

The DQO process is a seven-step planning approach based on scientific methods that are designed to ensure that the type, quantity, and quality of environmental data used for decision making are appropriate for the intended application. The DQO process, as defined by the EPA, consists of the following seven steps that are designed to provide a systematic approach to resolving issues that pertain to this remediation project (EPA, 2000):

- Stating the Problem
- Identifying the Decisions
- Identifying Inputs to the Decisions
- Defining the Boundaries
- Developing a Decision Rule
- Specifying Limits on the Decision Error
- Optimizing Sampling Design

The DQOs are presented in Table B.8-1.

8.2 ANALYTICAL DATA QUALITY OBJECTIVES

Analytical data will be obtained using published, standard methods in a state of California Department of Health Services (DHS)-certified and Naval Facilities Engineering Service Center (NFESC)-evaluated laboratory. Analytical DQOs will be assessed through measures of PARCC parameters. The analytical methods used, project-required RLs, and project QC criteria are also detailed in this document.

8.2.1 Quality Control Criteria

QC criteria definitions are as follows:

- **Precision**—A measure of the reproducibility of a set of replicate results or the agreement among repeat observations made under the same conditions. Analytical

precision is the measurement of the variability associated with duplicate or replicate analyses. For this project, a laboratory control sample (LCS) will be used to determine the precision of the analytical method. Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate, laboratory duplicate, and MSD samples will be used to assess field and analytical precision, and the precision measurement will be determined using the relative percent difference (RPD) between the duplicate sample results. The formula for calculating the RPD is as follows:

$$\text{RPD} = 100 \times 2 \times (\text{result} - \text{duplicate result}) / (\text{result} + \text{duplicate result})$$

- **Accuracy**—The nearness of a result or the mean of a set of results to the true or accepted value. Analytical accuracy is measured by comparing the percent recovery of analytes spiked into a LCS or MS against a control limit. Surrogate compound recoveries (applicable for chemical analysis only) are also used to assess accuracy and method performance for each sample analyzed. The formula for calculating accuracy uses the following equation to determine percent recovery (%R) of specific analytes.

$$\%R = 100 \times (\text{spiked sample result} - \text{unspiked sample result}) / \text{amount of spike added}$$

- **Representativeness**—The degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter mostly concerned with the proper design of the sampling program.
- **Completeness**—The percentage of measurements made that are judged to be valid measurements. The completeness goal is to generate a sufficient amount of valid data to meet project needs. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not qualified with a rejected (“R”) flag. The requirement of completeness is 95 percent for aqueous samples and 90 percent for soil samples and is determined using the following equation:

$$\% \text{ completeness} = 100 \times (\text{number of valid analyte results} / \text{number of possible results})$$

- **Comparability**—A qualitative parameter expressing the confidence with which one data set can be compared with another. Sample data should be comparable with other measurements for similar samples and sample conditions. The objective for the QA/QC program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats.

8.2.2 Project Reporting Limits

The RLs established for this project are presented in Table B.8-2.

8.2.3 Project Quality Control Limits

The precision and accuracy QC limits for each method are presented in Table B.8-3.

9.0 ANALYTICAL QUALITY CONTROL PROCEDURES

This section describes laboratory qualification, sample custody and documentation, QC procedures, QC samples, preventative maintenance, data review, and deliverables for the collection of samples for chemical and radiological analysis.

9.1 LABORATORY QUALIFICATION

The analytical laboratories selected to analyze samples for this project will be certified by the California DHS for all of the analytical methods required for the project. In addition, the laboratory must successfully complete the NFESC Laboratory Evaluation Program prior to sampling activities and maintain current status throughout the duration of the project.

The laboratory selected for the project must be capable of providing the required turnaround times, project QC, and data deliverables required by this SAP.

9.2 LABORATORY SAMPLE CUSTODY AND DOCUMENTATION

The integrity and traceability of samples from the time they are collected through the time data are reported are essential in any sampling and analysis program. The handling of the samples and transferring of custody must be well-documented given the evidentiary nature of the analytical data. A sample is considered to be in one's custody if it meets any of the following criteria:

1. In actual possession or in view of the person who collected the sample
2. Locked in a secure area
3. Placed in an area restricted to authorized personnel

The samples will be delivered to the person in the laboratory authorized to receive samples (referred to as the sample custodian). Upon receipt of a sample, the sample custodian will inspect the condition of the sample (including the temperature of the cooler) and the custody seal, reconcile the information on the sample label against that on the COC record, assign a unique laboratory tracking number, log the sample in the laboratory logbook, and store the sample in a secured sample storage room.

The TtEC Project Chemist will be informed immediately of any inconsistencies between the COC record and the sample containers received. Any deviations from accepted sample handling procedures will be documented, and the TtEC Project Chemist will be informed.

9.2.1 Corrections to Custody Documentation

Changes or corrections on any project documentation will be made by crossing out the erroneous item with a single line initialing (by the person performing the correction) and dating the correction. The original item, although erroneous, must remain legible beneath the cross-out line. The new information will be written above the crossed-out item. Corrections must be written clearly and legibly with indelible black or blue.

9.3 LABORATORY QUALITY CONTROL PROCEDURES

The analytical laboratory must have written SOPs defining the instrumentation, instrumentation maintenance, tuning, calibration, method detection and RLs, QC requirements, blank requirements, and step-by-step procedures for each analytical method. The SOPs must be available to the analysts performing the work. The SOPs must meet or exceed the requirements of the analytical methods cited in this SAP and in the *Quality Systems Manual for Environmental Laboratories* (DoD, 2005). The laboratory must maintain logs of all activities that have an impact on the quality of the laboratory results.

Any portion of the method that is subcontracted by the laboratory to another laboratory or sent to another facility of the same network of laboratories must have the prior approval of the TtEC Project Chemist.

The laboratory must maintain the instruments in working condition required by the methods specified for the analyses. Sufficient redundancy in equipment must be available in the laboratory to handle downtime situations.

Method substitution because of instrumental failure will not be permitted without approval from the TtEC Project Chemist.

9.4 LABORATORY QUALITY CONTROL SAMPLES

The following subsections describe in detail the laboratory QC samples required by this project.

9.4.1 Calibration

All instruments and equipment must be calibrated in accordance with the specified methods, unless different instructions are included in this document. Each instrument must be calibrated with the standard solutions appropriate to the type of instrument and the calibration range established for the method.

Initial calibrations (ICALs) are performed when the method is first used and again whenever the continuing calibrations fail to meet their respective acceptance criteria. In addition, if the instrument undergoes significant maintenance, the ICAL must be repeated.

Continuing calibrations verify that the instrument performance has remained within the limits set at the time of the ICAL. The frequency of continuing calibrations is specified in referenced methods.

9.4.2 Instrument/Calibration Blanks (applicable to chemical analyses only)

Instrument blanks are run to ensure that analytes from previous runs are out of the system and do not contaminate succeeding runs. Instrument blanks must be run following calibration runs, before sample analyses are performed, and after samples containing high concentrations of potentially interfering materials are found.

Target analytes must not appear in the instrument blanks at concentrations greater than half the required RLs. If the laboratory consistently observes contaminants in the instrument blanks, the laboratory must investigate the source of the contamination and eliminate it, if possible.

9.4.3 Method Blanks

Method blanks are prepared in the same manner as the samples, using the same reagents and glassware used for samples. The purpose of the method blank is to ensure that the equipment and reagents used in preparing the samples are free of contaminants that could interfere with the analysis. The method blank must be prepared and analyzed for each batch of 20 project samples or less per matrix (aqueous and solid) type.

The method blank must not exhibit analytes at concentrations greater than half the required RLs. If contaminants are found that either contribute to the apparent concentration of a particular target analyte or interfere with the analysis, the analysis must be stopped, the source of contamination identified and corrected, and the analysis repeated. Contamination in the method blank above half the RLs will require that the entire associated batch of extracts or digestates be reprepared and reanalyzed. Hence, it is very important to make sure that no such contamination is present.

9.4.4 Laboratory Control Samples

LCSs are purchased samples containing known concentrations of specific target analytes. LCSs can also be prepared by spiking known amounts of target analytes into a well-characterized blank matrix. The matrix will be analyte-free, laboratory reagent-grade water for water samples and clean sand or equivalent for soil samples.

The LCS is prepared and run at a frequency of one per 20 project samples per matrix with the associated samples, using the same reagents and volumes. For chemical analyses, if insufficient quantity of sample is available for the MS/MSD, the LCS will be prepared and analyzed in duplicates. All analytes in the LCS must meet recovery criteria. If the criteria are not met, the entire batch of samples must be reprepared, together with a new LCS, and reanalyzed.

9.4.5 Matrix Spike and Matrix Spike Duplicate

The MS/MSD serves to determine whether matrix effects are affecting recoveries. For inorganic and aqueous radiological analyses, only a single MS may be performed per batch. (MS is not applicable to soil samples for radiological analyses.) A MS/MSD is prepared by spiking a known amount of solution to two portions of a sample being run in a batch. Once the spike is added to the MS/MSD samples, these samples are carried through the complete sample preparation process along with the other samples in the batch. The MS/MSD recoveries are compared against each other and against the known amount of the spike. From this data, both accuracy and precision can be determined. The laboratory will perform a MS/MSD for chemical analyses at a frequency of one per 20 project samples per matrix. To prepare a project-specific MS/MSD, field personnel will collect additional sample volumes as necessary at a frequency of one per 20 samples. Field personnel will designate samples for MS/MSD analysis on the COC record.

9.4.6 Duplicates

Two types of duplicates, field and laboratory, will be performed. Field duplicates are two samples that are duplicates of each other. The purpose of field duplicates is to measure the consistency of field sampling. However, due to the heterogeneous nature of soils, results will be used to determine sampling variability rather than sampling precision. The field duplicate is treated the same as the other field samples, and identification is withheld from the laboratory.

The laboratory duplicate is created by the laboratory, where two aliquots are intentionally taken from the same sample and analyzed in parallel. This analysis serves to measure the precision of laboratory operations. Duplicate analyses will be applied only for radiological and inorganic analyses.

9.5 PREVENTIVE MAINTENANCE

All instruments must be maintained in accordance with the manufacturers' recommended procedures. The laboratory must define in its QA plan the frequency and type of maintenance for each instrument. The laboratory must also record all maintenance activities in an instrument logbook.

In addition to preventive maintenance, the laboratory must keep a sufficient supply of replacement parts on hand for those parts known to require frequent changes due to wear and tear or contamination.

Whenever preventive or corrective maintenance is applied to an instrument, the laboratory must demonstrate the instrument's return to operating conditions and must recalibrate the instrument prior to resumption of sample analyses.

9.6 DATA REVIEW

All data reported by the laboratory must be reviewed in accordance with the SOPs and as described in the following subsections.

9.6.1 Analyst Review

Each analyst that generates a data set is responsible for ensuring that 100 percent of the data comply with the method- and project-specific requirements and that any deviations or failure to meet criteria are documented for the project file.

9.6.2 Peer Review

One hundred percent of all data sets must be reviewed by an independent peer analyst. Peer reviews must be performed by an analyst that is qualified to perform the subject analytical method. The peer review must be comprehensive and include the following:

- Check 100 percent of manual entries for transcription errors
- Check 100 percent of manual calculations for accuracy
- Spot-check computer calculations to verify program validity
- Check for compliance with method- and project-specific QC requirements
- Check for completeness of raw data or supporting materials
- Confirm spectral assignments
- Check descriptions of deviations from method or project requirements
- Check for appropriate use of significant figures and rounding
- Check reported values for dilutions
- Evaluate reasonableness of results

9.6.3 Technical Review

Technical reviews by the responsible supervisor or designated alternate must be performed on 100 percent of reported data. The same individual may not perform peer and technical reviews on the same data set. The technical review must include the following:

- Check for compliance with method- and project-specific requirements
- Check the completeness of the reported information
- Check the information in the report narrative
- Evaluate the reasonableness of the results

If the responsible supervisor is the only qualified peer reviewer for a method, the requirement for the technical review is waived.

9.6.4 Management Review

One hundred percent of all data must receive management approval prior to release. The scope and content of management's review is at the laboratory's discretion. Authority to release data may be delegated to a technical supervisor or other party, if the term of the delegated authority is documented in the QA program file.

9.6.5 Quality Assurance Review

QA reviews of data from each section of the laboratory must be conducted on a routine basis. Annually, at least 10 percent of data reports generated using each analytical method must be reviewed by a member of the QA staff. The QA reviews must include the following:

- Check for compliance with required QC practices
- Check for compliance with approved SOPs
- Check for compliance with method and project requirements

QA data reviews may be conducted after the subject data have been reported to TtEC.

9.7 DELIVERABLES

The following sections describe the deliverable documents that will be submitted to TtEC by the analytical laboratory.

9.7.1 Hard-copy Deliverables

Two copies of the hard-copy data will be submitted to TtEC by the laboratory. The report pages will be sequentially numbered. The report will contain a table of contents referencing individual sections in the data package, original white copy of COC records, a copy of all corrective action reports, and a narrative documenting the resolution of all corrective actions and non-conformances. All TtEC samples will be cross-referenced to the associated QC samples. When revisions to data reports are required, the revised pages will be stamped with the notation "amended or revised report."

To allow third-party validation, two types of data packages will be required. They will be referred to as EPA Level III-equivalent or IV-equivalent packages. For this project, TtEC will request that 80 percent of the data be submitted in an EPA Level III-equivalent data package and 20 percent submitted in an EPA Level IV-equivalent data package. (For waste characterization samples, 100 percent of the data will be submitted in an EPA Level III-equivalent data package.) All data packages will be assembled in the following sequence:

- Cover page (with laboratory service identification number, TtEC project name, and TtEC project number)
- Original COC records (including cooler temperature and sample condition)

- Sample receipt forms
- Cross-reference table
- Case narrative
- Radiological raw data sequence:
 - Sample result forms, including method blanks
 - Sample raw data after each result form (EPA Level IV only)
 - QC summaries (raw data for EPA Level IV only)
 - ICAL
 - Calibration checks, including related continuing calibration verifications (CCVs)
 - Background checks, efficiency checks, self-absorption curves as applicable
 - Instrument run log
 - Sample preparation log
- Organic raw data sequence (by test):
 - Sample result forms, including method blanks
 - Sample raw data after each result form (EPA Level IV only)
 - Surrogate summaries (surrogate results may appear on the sample result forms)
 - QC summaries including internal standards
 - Tune data (gas chromatograph/mass spectrometer [GC/MS] only)
 - ICAL
 - Daily calibration checks, including related CCVs
 - Resolution check standards (GC/MS and pesticides) (if applicable)
 - QC (LCS, MS/MSD) raw data (EPA Level IV only)
 - Instrument run log
 - Sample preparation log
- Inorganic raw data sequence:
 - Sample results forms, including method blanks
 - Sample raw data (EPA Level IV only)
 - QC summaries
 - ICAL
 - Daily calibration checks, including all related CCVs
 - Calibration blanks, including all related continuing calibration blanks
 - Interference check standards A and B for inductively coupled plasma-atomic emission spectrometer (ICP-AES) only
 - QC raw data (EPA Level IV only)
 - Post-digestion spike results
 - Method of standard additions
 - ICP-AES serial dilutions

- Instrument run log
- Sample preparation log

9.7.2 Electronic Deliverables

The electronic data deliverable (EDD) will be in ASCII format. This will be compatible with the Naval Electronic Data Deliverable standard as described in *Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards* (Southwest Division, Naval Facilities Engineering Command, 2005). The laboratory will verify that the EDD and the hard-copy reports are identical. Both the EDD and the hard-copy report will present results to two or three significant figures. For organic results, two significant figures will be used for all results. For inorganic results, two significant figures will be used for results less than 10, and three significant figures will be used for results greater than 10. For radiological results, three significant figures will be used for all results. Results for QC analyses (method blanks, MS/MSD, LCS, and duplicates) will be reported up to three significant figures. The EDD for each sample delivery group is due at the same time as the hard-copy report, 21 calendar days (30 calendar days for radiological analysis) after the last sample of the sample delivery group has been delivered to the laboratory.

10.0 DATA QUALITY MANAGEMENT

10.1 DATA MANAGEMENT

The following sections describe the requirements for the management of hard-copy data and electronic data for samples collected for chemical and radiological analysis.

10.1.1 Hard-copy Report

All relevant raw data and documentation, including, but not limited to, logbooks, data sheets, electronic files, and final reports, will be maintained by the laboratory for at least 7 years. TtEC will be notified 30 days before disposal of any relevant laboratory records.

TtEC will maintain copies of all COC records. Laboratory reports will be logged in upon receipt and filed in chronological order. The second copy of the report will be sent for third-party data validation.

10.1.2 Electronic Data

Field information (date and time collected, sample identification, and so forth) will be entered directly into the main database from the COC records or uploaded from electronic files generated in the field.

Upon receipt by the TtEC Data Manager, electronic data will be uploaded into a Microsoft® Access database. The uploaded data will be processed to compare the fields against a list of required values. If any errors are returned by the program, the file will be manually edited or regenerated by the laboratory. The laboratory database will be merged with the field database, and reports will be generated from the merged database.

10.2 DATA VALIDATION

All sample data will be validated by an independent data validation company except for waste characterization samples. Data will be validated at 80 percent EPA Level III and 20 percent EPA Level IV. Currently, there are no standards for data validation of radiological analyses. Therefore, guidance documents on validation of radiological data and modified functional guidelines will be used by the validator. Data not meeting method and/or SAP specifications will be flagged as estimated (“J”) or rejected (“R”).

The data validation company will have the following qualifications:

1. A minimum of 5 years of experience in the environmental data validation business
2. Prior experience on DON RAC or Comprehensive Long-term Environmental Action projects
3. DON data validation experience
4. Active peer review program

Personnel must have the following qualifications:

1. Data Reviewer:
 - Bachelor of science degree or higher in chemistry or a physical science
 - 5 years of combined experience with approximately 2 years in data validation and 3 years conducting laboratory analysis in an environmental laboratory using the EPA-approved methods being validated
2. Peer Reviewer:
 - Bachelor of science degree or higher in chemistry or a physical science
 - 5 years of combined experience with approximately 2 years in data validation and 3 years conducting laboratory analysis in an environmental laboratory using the EPA-approved methods being validated

10.3 DATA EVALUATION

Following third-party validation, data will be further evaluated by the TtEC Project Chemist. During this process, the Project Chemist will determine which of the advisory data qualifiers provided by the independent data validator will be retained or removed. The evaluation of data will be based on method requirements and the results of the QC samples, the level of contamination of samples indicated by the method blanks analysis, and the overall indication of interference due to contamination. The following data qualifiers will be used in the report:

- J - Result is estimated
- U - Analyte is not detected at or above the stated RL
- R - Data are rejected
- UJ- Analyte is not detected, but there is an uncertainty about the RL

Data qualifying will be used to alert end users to uncertainties associated with the data. The evaluation flags will be entered into a special field in the electronic database. Thus, when data processing is complete, the data for each analyte will have the flag designated by the laboratory and the flag designated by the evaluator, as appropriate.

11.0 QUALITY ASSURANCE OVERSIGHT

QA oversight for this project will include system audits of field activities and of the laboratory subcontracted by the DON to perform the analysis.

11.1 FIELD AUDITS

The TtEC and NAVFAC SW QA Officers may schedule audits of field activities at any time to evaluate the execution of sample collection, identification, and control in the field. The audit will also include observations of COC procedures, field documentation, instrument calibrations, and field measurements.

Field documents and COC records will be reviewed to ensure that all entries are printed or written in indelible black or blue ink, dated, and signed.

Sampling operations will be reviewed and compared to this SAP and other applicable SOPs. The auditor will verify that the proper sample containers are used, the preservatives are added or are already present in the container, and the documentation of the sampling operation is adequate.

Field measurements will be reviewed by random spot-checking to determine that the instrument is within calibration, the calibration is done at the appropriate frequency, and that the sensitivity range of the instrument is appropriate for the project.

11.1.1 Corrective Action

Nonconformance identified during the field audit will be recorded on a Nonconformance Report. All nonconformance and corrective actions will be processed in accordance with the TtEC Quality Control Program Plan.

The TtEC QC Program Manager will monitor corrective action documentation, verify implementation of the corrective action, track and analyze the corrective action, and closeout corrective action documentation upon completion of the corrective action.

11.2 LABORATORY AUDITS

Laboratories selected to perform the analyses are required to have successful completion of the NFESC laboratory evaluation process throughout the project. This process consists of a laboratory QA plan review, performance evaluation samples, a data package review, and an on-site audit. Because of this requirement, TtEC will not perform an on-site audit or visit, unless it is deemed necessary.

Laboratory oversight by TtEC will include a thorough review of the preliminary report and hard-copy data packages. The information that may be obtained from the data packages consists of the following:

- Correctness of COC procedures
- Adherence to method holding times
- Project RLs
- Spiking levels, frequency, and recovery
- Accuracy of analytical methods through the LCSs and surrogates

11.2.1 Corrective Action

The laboratory will have a QA/QC and corrective action program that addresses all out-of-control situations. Following completion of analyses, laboratory personnel will verify compliance with the minimum QC requirements of the project and the laboratory QA/QC plan. If any of the parameters fall outside the control limits, corrective action will be implemented.

Initial corrective action is to verify that no obvious calculation errors have occurred. If appropriate, reanalysis will be performed. If the reanalysis confirms the initial out-of-control limits result, the chemist will notify the laboratory supervisor, who will initiate the corrective action process. Corrective actions may include, but are not limited to, the following:

- Verification of dilution factors
- Examination of sample for nonhomogeneity
- Verification of sample preparation
- Checking of standard preparation logbook
- Verification of instrument performance
- Checking of reagent-grade water purity
- Monitoring chemist's method performance for procedure verification

Notification and prompt involvement of the TtEC Project Chemist in the corrective action process are absolutely necessary in determining an appropriate resolution. Corrective action records will document all steps taken in the corrective action process, beginning with a description of the problem and ending with a final resolution. A copy of the corrective action report will be sent to the TtEC Project Chemist immediately and will be maintained in the project files at TtEC.

All corrective action reports will be maintained by the laboratory in a project file and delivered to TtEC as part of the hard-copy deliverable.

12.0 SAP REVISION OR AMENDMENT

When circumstances arise that impact the original project DQOs, such as a significant change in work scope, this SAP will be revised or amended. The modification process will be based on EPA guidelines, direction from the Navy and QA Officer, and will be in conjunction with *Environmental Work Instruction (EWI) #2, 3EN2.2, Review, Approval, Revision, and Amendment of Sampling and Analysis Plans (SAPs)* (Southwest Division Naval Facilities Engineering Command, 2001).

13.0 REFERENCES

- Department of Defense (DoD). 2005. *Quality Systems Manual for Environmental Laboratories*. March.
- Department of Defense (DoD), Department of Energy (DOE), Nuclear Regulatory Commission (NRC), and U.S. Environmental Protection Agency (EPA). 2000. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575*. August.
- Southwest Division Naval Facilities Engineering Command. 2001. *Environmental Work Instruction (EWI) #2, 3EN2.2, Review, Approval, Revision, and Amendment of Sampling and Analysis Plans (SAPs)*.
- _____. 2005. *Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Deliver Standards*. April.
- Tetra Tech FW, Inc. 2005a. *Final Installation Restoration Site 1 Radiological Characterization Survey Report*. Alameda Point, Alameda, California. August.
- _____. 2005b. *Final Installation Restoration Site 2 Radiological Characterization Survey Report*. Alameda Point, Alameda, California. August.
- U.S. Environmental Protection Agency (EPA). 1980. *Gamma Emitting Radionuclides by Gamma Ray Spectrometry, Prescribed Procedures for Measurement of Radioactivity in Drinking Water*. EPA/600/4-80-032. August.
- _____. 1986. *Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846*. Third Edition and final updates.
- _____. 2001. *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS*. March.

TABLES

TABLE B.5-1
SAMPLE CONTAINERS, PRESERVATIVES,
AND HOLDING TIME REQUIREMENTS

Analyte	Analytical Method	Container	Preservative	Holding Time
SOIL SAMPLES				
Gamma Spectroscopy	EPA Method 901.1M or equivalent	Marinelli Beaker	None	6 months
⁹⁰ Sr	DOE Sr-01/Sr-02 or equivalent	Marinelli Beaker	None	6 months
WATER SAMPLES^a				
Gamma Spectroscopy	EPA Method 901.1 or equivalent	Two 1-L HDPE	pH ≤ 2 w/ HNO ₃	6 months
⁹⁰ Sr	EPA Method 905.0 or equivalent	Two 1-L HDPE	pH ≤ 2 w/ HNO ₃	6 months
VOCs	EPA Method 8260B	Three 40-mL VOA vials	pH ≤ 2 w/ HCl, Cool, 4±2°C	14 days to analyze
SVOCs	EPA Method 8270C	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
Pesticides	EPA Method 8081A	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
PCBs	EPA Method 8082	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
Metals	EPA Method 6010B/6020/7470A	One 500-mL HDPE	pH ≤ 2 w/ HNO ₃	6 months, except for mercury which is 28 days

Notes:

^a Water sample requirements are only for waste characterization samples

°C – degrees Celsius

mL – milliliter

DOE – Department of Energy

PCB – polychlorinated biphenyl

EPA – U.S. Environmental Protection Agency

⁹⁰Sr – Strontium-90

HCl – hydrochloric acid

SVOC – semivolatile organic compound

HDPE – high-density polyethylene

VOA – volatile organic analysis

HNO₃ – nitric acid

VOC – volatile organic compound

L – liter

TABLE B.7-1

PERSONNEL AND RESPONSIBILITIES

Key Position	Responsibility
NAVFAC SW QA Officer	<ul style="list-style-type: none"> • Reviewing and approving Sampling and Analysis Plan • Providing DON oversight of the TtEC QA Program • Providing technical and administrative oversight of TtEC's surveillance audit activities • Acting as point of contact for all matters concerning QA and the DON's Laboratory QA Program • Coordinating training on matters pertaining to generation and maintenance of quality of data • Authorizing the suspension of project execution if QA requirements are not adequately followed
Project Chemist	<ul style="list-style-type: none"> • Developing Sampling and Analysis Plan • Evaluating and selecting qualified subcontract laboratories • Implementing data QC procedures and performing auditing of field performance • Reviewing laboratory data prior to use • Coordinating data validation of laboratory data • Reviewing data validation reports • Preparing analytical reports and supporting project report preparation
RPM	<ul style="list-style-type: none"> • Performing project management for the DON • Ensuring that the project scope of work requirements are fulfilled • Overseeing the project cost and schedule • Acting as lead interface with agencies
TtEC Project Manager	<ul style="list-style-type: none"> • Coordinating work activities of subcontractors and TtEC personnel and ensuring that all personnel adhere to the administrative and technical requirements of the project • Monitoring and reporting the progress of work and ensuring that project deliverables are completed on time and within budget • Ensuring adherence to the requirements of the contract, project scope of work, and the project plans • Ensuring that all work activities are conducted in a safe manner in accordance with the SHSP • Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings • Serving as the senior contact between the DON and TtEC for actions and information related to the work • Ensuring effective implementation of the radiological record management program • Ensuring that all personnel assigned to perform fieldwork are appropriately monitored for exposure to ionization radiation • Coordinating regulatory site visits

TABLE B.7-1
PERSONNEL AND RESPONSIBILITIES

Key Position	Responsibility
ROICC	<ul style="list-style-type: none"> • Overseeing the technical and QA of the field activities • Providing governmental monitoring of the field health and safety program • Acting as DON liaison for base activities, such as security, permits, and communications
Radiological Site Manager	<ul style="list-style-type: none"> • Reviewing and approving project work plans and procedures • Acting as lead interface with regulatory agencies on radiological survey plans and reports • Together with the RPM, negotiating radiological release criteria with regulatory agencies • Reviewing and approving project reports • Ensuring compliance with applicable MARSSIM requirements • Recommending changes in TtEC scope to the RPM, as appropriate • Supporting public meetings

Notes:

DON – Department of the Navy

MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual

NAVFAC SW – Naval Facilities Engineering Command, Southwest Division

QA – quality assurance

QC – quality control

RAC – Remedial Action Contract

RASO – Radiological Affairs Support Office

ROICC – Resident Officer in Charge of Construction

RPM – Remedial Project Manager

SHSP – Site-specific Health and Safety Plan

TtEC – Tetra Tech EC, Inc.

TABLE B.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

This table incorporates changes applicable to IR Sites 1 and 2 shoreline areas, IR Site 32, and the former Radiological Shack area in IR Site 2.

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	Decisions	Inputs to the Decisions	Boundaries of the Study	Decision Rules	Limits on Decision Errors	Optimize the Sampling Design
<p>Radiological surveys were not conducted at IR Site 32, IR Site 1 and 2 shoreline areas, and the former Radiological Shack area in IR Site 2 during the initial radiological surveys performed by TtEC at IR Sites 1 and 2.</p> <p>The radiological survey requires soil sample analysis for radiological isotope determination.</p>	<p>1. Are anomalous locations at the southern or eastern edge of IR Site 32 boundaries identified during the radiological characterization survey? An anomalous location is a location on the border of site survey boundaries, where radioactivity levels are above background and requires step-outs.</p> <p>2. Is ²²⁶Ra detected above scan background concentrations during the surface scan survey?</p> <p>3. Is either ²²⁶Ra or ⁹⁰Sr detected in any of the 15 soil samples 3 sigma above the</p>	<p>Previous investigation results, as discussed in Section 2.0 of the Radiological Survey Work.</p> <p><u>The scan screening measurements collected in the reference areas will determine scan background levels. The reference area for the shoreline will be determined in conjunction with the DON.</u></p> <p>Radiological survey performed and analytical results from soil samples collected for this project.</p> <p>Since sample locations will be determined after the radiological survey is complete, the RASO</p>	<p>Figure B.1-2 illustrates the radiological survey areas for IR Site 1 and 2 shoreline areas, IR Site 32, and the former Radiological Shack area in IR Site 2.</p> <p>Soil samples for radiological analysis will be collected using a hand-auger to collect soil from zero to 20 inches bgs. Seventeen samples (15 biased samples and two field duplicate samples) will be collected between the four sites.</p> <p>Radiological screening and testing will be performed in accordance with Section 5.0 of the Radiological Survey Work Plan.</p>	<p>The data obtained from the survey and sampling will be used to evaluate potential remedial alternatives.</p> <p>1. If an anomalous location, as defined in Step 2, is identified at the southern or eastern edge of the IR Site 32 boundary, then the surveyor will follow the step-out procedures described in Section 4.1. If an anomalous location is not identified, then no further action will be required.</p> <p>2. If surface scan survey data indicate that ²²⁶Ra is detected above the background count rate (see Section 4.1 on background determination procedures), then the location will be marked as such. If surface scan survey data indicate ²²⁶Ra is not detected at above background concentrations, then the location will not be marked.</p>	<p>Scientifically sound and defensible site-specific data on the levels and distribution of residual contamination, as well as levels and distribution of radionuclides present as background are acquired by using appropriate field and laboratory techniques.</p> <p>Section 5.5 of the Radiological Survey Work Plan discusses the statistical tests used and the selection of acceptable decision errors.</p> <p>Analytical method requirements and project-specific DQOs were also established to limit decision errors. Published analytical method and laboratory-specific performance requirements are the primary determiners of DQOs for precision and accuracy.</p>	<p>At the location of the anomaly, the survey will step 10 feet outside the current boundary in each direction to identify any discrete sources. If an additional anomaly is identified within this area, the survey area will be extended in 10-foot increments until no further anomalies are encountered.</p> <p>Sampling will be performed in reference areas in accordance with the MARSSIM (DoD et al., 2000) methodology and requirements.</p> <p>The DON has determined that the survey units will be 2,000 m² (12, 520 square feet) and that 17 samples (15 samples and two field duplicate samples) will be collected between the four sites.</p> <p>Fifteen biased sample locations will be approved by the RASO prior to collecting soil samples. The field</p>

TABLE B.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	Decisions	Inputs to the Decisions	Boundaries of the Study	Decision Rules	Limits on Decision Errors	Optimize the Sampling Design
	background concentration of (0.559 pCi/g) for ²²⁶ Ra and non-detect for ⁹⁰ Sr? The background concentration was determined from previous site investigations as described in Section 4.1.	will approve TtEC's suggested sample locations. Data from five of the 15 soil samples analyzed for ⁹⁰ Sr. Soil sample locations will be approved by RASO prior to analyzing for ⁹⁰ Sr.		All locations where ²²⁶ Ra is detected above that background concentrations will be reviewed by RASO, who will determine which 15 locations will be sampled. 3. If ²²⁶ Ra or ⁹⁰ Sr is detected above background concentrations, then these areas will be documented as such and these data will be used to evaluate remedial alternatives. If neither ²²⁶ Ra nor ⁹⁰ Sr is detected above background concentrations, then those areas where the samples were collected will require no further action.		duplicates will be chosen randomly by the on-site sample technician. These samples will be analyzed by the off-site laboratory by gamma spectroscopy. Five of the 15 samples will be selected by TtEC and then approved by the RASO for analysis of ⁹⁰ Sr.

Notes:

- bgs – below ground surface
- DoD – Department of Defense
- DON – Department of the Navy
- DQO – data quality objective
- IR – Installation Restoration
- m² – square meter
- MARSSIM – Multi-Agency Radiation Survey and Site Investigation Manual
- ²²⁶Ra – radium-226
- RASO – Radiological Affairs Support Office
- ⁹⁰Sr – strontium-90
- TtEC – Tetra Tech EC, Inc.

TABLE B.8-2

PROJECT REPORTING LIMITS

Parameter	Method	Analyte	Soil		
			RL	Action Levels for Soil Sampling**	Unit
Gamma Spectroscopy	EPA Method 901.1M or equivalent ^a	Americium-241	*	N/A	pCi/g
		Cobalt-60	*	N/A	pCi/g
		Cesium-137	*	N/A	pCi/g
		Europium-152	*	N/A	pCi/g
		Europium-154	*	N/A	pCi/g
		Radium-226	*	LBGR Above background ^b	pCi/g
Strontium-90	DOE Sr-01/Sr-02 or equivalent	Strontium-90	*	Above background ^c	pCi/g

TABLE B.8-2
PROJECT REPORTING LIMITS

Parameter	Method	Analyte	Water ***			
			RL	STLC Limit	TCLP Limit	Unit
VOCs	EPA Method 8260B	1,1,1-Trichloroethane	5	NE	NE	µg/L
		1,1,2,2-Tetrachloroethane	5	NE	NE	µg/L
		1,1,2-Trichloroethane	5	NE	NE	µg/L
		1,1-Dichloroethane	5	NE	NE	µg/L
		1,1-Dichloroethene	5	NE	700	µg/L
		1,2-Dichloroethane	5	NE	500	µg/L
		1,2-Dichloropropane	5	NE	NE	µg/L
		2-Hexanone	50	NE	NE	µg/L
		Acetone	50	NE	NE	µg/L
		Benzene	5	NE	500	µg/L
		Bromodichloromethane	5	NE	NE	µg/L
		Bromoform	5	NE	NE	µg/L
		Bromomethane	5	NE	NE	µg/L
		Carbon tetrachloride	5	NE	500	µg/L
		Chlorobenzene	5	NE	100,000	µg/L
		Chloroethane	5	NE	NE	µg/L
		Chloroform	5	NE	6,000	µg/L
		Chloromethane	5	NE	NE	µg/L
		cis-1,2-Dichloroethene	5	NE	NE	µg/L
		cis-1,3-Dichloropropene	5	NE	NE	µg/L
		Dibromochloromethane	5	NE	NE	µg/L
		Ethylbenzene	5	NE	NE	µg/L
		MEK	50	NE	200,000	µg/L
		MTBE	10	NE	NE	µg/L
		Methylene chloride	5	NE	NE	µg/L
		MIBK	50	NE	NE	µg/L
		Styrene	5	NE	NE	µg/L
		Tetrachloroethene	5	NE	700	µg/L
		Toluene	5	NE	NE	µg/L
		trans-1,2-Dichloroethene	5	NE	NE	µg/L
		trans-1,3-Dichloropropene	5	NE	NE	µg/L
		Trichloroethene	5	204,000	500	µg/L
		Vinyl acetate	50	NE	NE	µg/L
		Vinyl chloride	5	NE	200	µg/L
Xylenes (Total)	15	NE	NE	µg/L		

TABLE B.8-2

PROJECT REPORTING LIMITS

Parameter	Method	Analyte	Water ***			
			RL	STLC Limit	TCLP Limit	Unit
PCBs	EPA Method 8082	Aroclor 1016	2	NE	5,000	µg/L
		Aroclor 1221	5	NE	5,000	µg/L
		Aroclor 1232	2	NE	5,000	µg/L
		Aroclor 1242	2	NE	5,000	µg/L
		Aroclor 1248	2	NE	5,000	µg/L
		Aroclor 1254	2	NE	5,000	µg/L
		Aroclor 1260	2	NE	5,000	µg/L
		Organochlorine Pesticides	EPA Method 8081A	4,4'-DDD	0.1	100
4,4'-DDE	0.1			100	NE	µg/L
4,4'-DDT	0.1			100	N/A	µg/L
alpha-BHC	0.05			NE	NE	µg/L
Aldrin	0.05			140	N/A	µg/L
beta-BHC	0.05			NE	NE	µg/L
delta-BHC	0.05			NE	NE	µg/L
Chlordane (technical)	2			250	30	µg/L
Dieldrin	0.1			800	NE	µg/L
Endosulfan Sulfate	0.1			NE	NE	µg/L
Endosulfan I	0.05			NE	NE	µg/L
Endosulfan II	0.1			NE	NE	µg/L
Endrin	0.1			20	20	µg/L
Endrin Aldehyde	0.1			NE	NE	µg/L
Endrin Ketone	0.1			NE	NE	µg/L
gamma-BHC (Lindane)	0.05			400	400	µg/L
Heptachlor	0.05			470	8	µg/L
Heptachlor Epoxide	0.05			8	8	µg/L
Methoxychlor	0.1			10,000	10,000	µg/L
Toxaphene	0.5			500	500	µg/L
Metals	EPA Methods 6010B/60207470A	Antimony	100	15,000	N/A	µg/L
		Arsenic	10	5,000	5,000	µg/L
		Barium	10	100,000	100,000	µg/L
		Beryllium	1	750	NE	µg/L
		Cadmium	10	1,000	1,000	µg/L
		Chromium	10	5,000	5,000	µg/L
		Cobalt	20	80,000	NE	µg/L
		Copper	20	25,000	NE	µg/L
		Lead	10	5,000	5,000	µg/L
		Mercury	0.5	200	200	µg/L
		Molybdenum	500	350,000	NE	µg/L
		Nickel	20	20,000	NE	µg/L
		Selenium	10	1,000	1,000	µg/L
		Silver	10	5,000	5,000	µg/L

TABLE B.8-2
PROJECT REPORTING LIMITS

Parameter	Method	Analyte	Water ***			
			RL	STLC Limit	TCLP Limit	Unit
Metals (Continued)		Thallium	10	7,000	NE	µg/L
		Vanadium	10	24,000	NE	µg/L
		Zinc	20	250,000	NE	µg/L
SVOCs	EPA Method 8270C	1,2,4-Trichlorobenzene	10	NE	NE	µg/L
		1,2-Dichlorobenzene	10	NE	NE	µg/L
		1,3-Dichlorobenzene	10	NE	NE	µg/L
		1,4-Dichlorobenzene	10	NE	7,500	µg/L
		2,4,5-Trichlorophenol	10	NA	400,000	µg/L
		2,4,6-Trichlorophenol	10	NE	2,000	µg/L
		2,4-Dichlorophenol	10	NE	NE	µg/L
		2,4-Dimethylphenol	10	NE	NE	µg/L
		2,4-Dinitrophenol	50	NE	NE	µg/L
		2,4-Dinitrotoluene	10	NE	130	µg/L
		2,6-Dinitrotoluene	10	NE	NE	µg/L
		2-Chloronaphthalene	10	NE	NE	µg/L
		2-Chlorophenol	10	NE	NE	µg/L
		2-Methylphenol	10	NE	200,000	µg/L
		2-Nitroaniline	50	NE	NE	µg/L
		2-Nitrophenol	10	NE	NE	µg/L
		3,3'-Dichlorobenzidine	20	NE	NE	µg/L
		3-Nitroaniline	50	NE	NE	µg/L
		4,6-Dinitro-2-methylphenol	50	NE	NE	µg/L
		4-Bromophenyl phenyl ether	10	NE	NE	µg/L
		4-Chloro-3-methylphenol	20	NE	NE	µg/L
		4-Chloroaniline	20	NE	NE	µg/L
		4-Chlorophenyl phenyl ether	10	NE	NE	µg/L
		4-Methylphenol	10	NE	200,000	µg/L
		4-Nitroaniline	50	NE	NE	µg/L
		4-Nitrophenol	50	NE	NE	µg/L
		Bis(2-chloroethoxy)methane	10	NE	NE	µg/L
		Bis(2-chloroethyl)ether	10	NE	NE	µg/L
		Bis(2-chloroisopropyl)ether	10	NE	NE	µg/L
		Bis(2-ethylhexyl)phthalate	20	NE	NE	µg/L
		Butyl benzyl phthalate	10	NE	NE	µg/L
		Di-n-butyl phthalate	10	NE	NE	µg/L
		Di-n-octyl phthalate	10	NE	NE	µg/L
		Dibenzofuran	10	NE	NE	µg/L
Diethyl phthalate	10	NE	NE	µg/L		
Dimethyl phthalate	10	NE	NE	µg/L		
Hexachlorobenzene	10	NE	130	µg/L		
Hexachlorobutadiene	10	NE	500	µg/L		
Hexachlorocyclopentadiene	10	NE	NE	µg/L		

TABLE B.8-2

PROJECT REPORTING LIMITS

Parameter	Method	Analyte	Water ***			
			RL	STLC Limit	TCLP Limit	Unit
SVOCs (continued)		Hexachloroethane	10	NE	3,000	µg/L
		N-Nitrosodi-n-propylamine	10	NE	NE	µg/L
		N-Nitrosodiphenylamine	10	NE	NE	µg/L
		Nitrobenzene	10	NE	2,000	µg/L
		Pentachlorophenol	50	1,700	100,000	µg/L
		Phenanthrene	10	NE	NE	µg/L
		Phenol	10	NE	NE	µg/L
		Pyridine	50	NE	5,000	µg/L
		Acenaphthene	10	NE	NE	µg/L
		Acenaphthylene	10	NE	NE	µg/L
		Anthracene	10	NE	NE	µg/L
		Benzo[a]anthracene	10	NE	NE	µg/L
		Benzo[a]pyrene	10	NE	NE	µg/L
		Benzo[b]fluoranthene	10	NE	NE	µg/L
		Benzo[g,h,i]perylene	10	NE	NE	µg/L
		Benzo[k]fluoranthene	10	NE	NE	µg/L
		Chrysene	10	NE	NE	µg/L
		Dibenz(a,h)anthracene	10	NE	NE	µg/L
		Fluoranthene	10	NE	NE	µg/L
		Fluorene	10	NE	NE	µg/L
		Indeno[1,2,3-cd]pyrene	10	NE	NE	µg/L
Naphthalene	10	NE	NE	µg/L		
Pyrene	10	NE	NE	µg/L		
Gamma Spectroscopy	EPA Method 901.1 or equivalent ^a	Americium-241	*	NE	NE	pCi/L
		Cobalt-60	*	NE	NE	pCi/L
		Cesium-137	*	NE	NE	pCi/L
		Europium-152	*	NE	NE	pCi/L
		Europium-154	*	NE	NE	pCi/L
		Radium-226	*	NE	NE	pCi/L
Strontium-90	EPA Method 905.0 or equivalent	Strontium-90	*	NE	NE	pCi/L

TABLE B.8-2

PROJECT REPORTING LIMITS

Notes:

- * Reporting limits for radiological analyses are calculated with every analysis. They are calculated based on background, sample size, and count time.
- ** Action levels are not applicable to site characterization samples except as listed.
- *** Action levels for wastewater characterization samples are based on STLC and TCLP limits.
- a The isotopes listed represent a standard list of radionuclides to be reported by the laboratory. However, laboratory will be instructed to report any detected isotopes in addition to the ones listed during each sample analysis.
- b The background level LBGR will be calculated based on survey and analytical results.
- c Above background is defined as any detection above the calculated background value. Background values have been established by TtEC during previous investigations at the sites.

µg/L – micrograms per liter

BHC – benzene hexachloride

DDD – dichlorodiphenyldichloroethane

DDE – dichlorodiphenyldichloroethene

DDT – dichlorodiphenyltrichloroethane

DOE – Department of Energy

EPA – U.S. Environmental Protection Agency

LBGR – lower boundary of the gray region

MEK – methyl ethyl ketone

MIBK – methyl isobutyl ketone

MTBE – methyl tert-butyl ether

N/A – not applicable

NE – not established

PCB – polychlorinated biphenyl

pCi/g – picocurie per gram

pCi/L – picocurie per liter

RL – reporting limit

STLC – Soluble Threshold Limit Concentration

SVOC – semivolatile organic compound

TCLP – Toxicity Characteristic Leaching Procedure

VOC – volatile organic compound

TABLE B.8-3

QUALITY CONTROL ACCEPTANCE CRITERIA

Method	Analyte	Accuracy Soil (%R)	Precision Soil (RPD)	Accuracy Water (%R)	Precision Water (RPD)
EPA Method 901.1M (soils) and EPA Method 901.1 (water) or equivalent	Americium-241	75-125	≤ 30	75-125	≤ 30
	Cobalt-60	75-125	≤ 30	75-125	≤ 30
	Cesium-137	75-125	≤ 30	75-125	≤ 30
	Europium-152	75-125	≤ 30	75-125	≤ 30
	Europium-154	75-125	≤ 30	75-125	≤ 30
	Radium-226	75-125	≤ 30	75-125	≤ 30
DOE Sr-01/Sr-02 (soil) and EPA Method 905.0 (water) or equivalent	Strontium-90	75-125	≤ 30	75-125	≤ 30
EPA Method 8260B	1,1-Dichloroethene	N/A	N/A	75-125	≤ 20
	Benzene	N/A	N/A	75-125	≤ 20
	Chlorobenzene	N/A	N/A	75-125	≤ 20
	Trichloroethene	N/A	N/A	75-125	≤ 20
	Toluene	N/A	N/A	75-125	≤ 20
	<i>Surrogates:</i>	N/A	N/A		
	Toluene-D8	N/A	N/A	75-125	N/A
	4-Bromofluorobenzene	N/A	N/A	75-125	N/A
	1,2-Dichloroethane-D4	N/A	N/A	75-125	N/A
	EPA Method 8270C	1,2,4-Trichlorobenzene	N/A	N/A	44-142
1,4-Dichlorobenzene		N/A	N/A	30-125	≤ 30
2,4-Dinitrotoluene		N/A	N/A	39-139	≤ 30
Acenaphthene		N/A	N/A	49-125	≤ 30
2-Chlorophenol		N/A	N/A	41-125	≤ 30
n-Nitrosodi-n-propylamine		N/A	N/A	37-125	≤ 30
4-Chloro-3-methyl phenol		N/A	N/A	44-125	≤ 30
4-Nitrophenol		N/A	N/A	25-131	≤ 30
Pentachlorophenol		N/A	N/A	28-136	≤ 30
Phenol		N/A	N/A	25-125	≤ 30
Pyrene		N/A	N/A	47-136	≤ 30
<i>Surrogates:</i>		N/A	N/A		
2,4,6-Tribromophenol		N/A	N/A	25-134	N/A
2-Fluorbiphenyl		N/A	N/A	43-125	N/A
2-Fluorophenol		N/A	N/A	25-125	N/A
Nitrobenzene-D5		N/A	N/A	32-125	N/A
Phenol-D5		N/A	N/A	25-125	N/A
Terphenyl-D14	N/A	N/A	42-126	N/A	

TABLE B.8-3
QUALITY CONTROL ACCEPTANCE CRITERIA

Method	Analyte	Accuracy Soil (%R)	Precision Soil (RPD)	Accuracy Water (%R)	Precision Water (RPD)
EPA Method 8081A	4,4-DDT	N/A	N/A	65-103	≤ 30
	Aldrin	N/A	N/A	60-101	≤ 30
	Dieldrin	N/A	N/A	70-104	≤ 30
	Endrin	N/A	N/A	73-102	≤ 30
	gamma-BHC (Lindane)	N/A	N/A	70-111	≤ 30
	Heptachlor	N/A	N/A	56-111	≤ 30
	<i>Surrogates:</i>	N/A	N/A		
	DCBP	N/A	N/A	25-143	N/A
	TCMX	N/A	N/A	25-143	N/A
EPA Method 8082	Aroclor 1016	N/A	N/A	50-140	≤50
	Aroclor 1260	N/A	N/A	50-140	≤50
	<i>Surrogate:</i>	N/A	N/A		
	Decachlorobiphenyl	N/A	N/A	30-140	N/A
	Tetrachloro-m-xylene	N/A	N/A	30-140	N/A
EPA Method 6010B/6020/7470A	Antimony	N/A	N/A	75-125	≤ 30
	Arsenic	N/A	N/A	75-125	≤ 30
	Barium	N/A	N/A	75-125	≤ 30
	Beryllium	N/A	N/A	75-125	≤ 30
	Cadmium	N/A	N/A	75-125	≤ 30
	Chromium	N/A	N/A	75-125	≤ 30
	Cobalt	N/A	N/A	75-125	≤ 30
	Copper	N/A	N/A	75-125	≤ 30
	Lead	N/A	N/A	75-125	≤ 30
	Mercury	N/A	N/A	75-125	≤ 30
	Molybdenum	N/A	N/A	75-125	≤ 30
	Nickel	N/A	N/A	75-125	≤ 30
	Selenium	N/A	N/A	75-125	≤ 30
	Silver	N/A	N/A	75-125	≤ 30
	Thallium	N/A	N/A	75-125	≤ 30
	Vanadium	N/A	N/A	75-125	≤ 30
	Zinc	N/A	N/A	75-125	≤ 30

Notes:

%R – percent recovery

BHC – benzene hexachloride

DCBP – decachlorobiphenyl

DDT – dichlorodiphenyltrichloroethane

DOE – Department of Energy

EPA – U.S. Environmental Protection Agency

N/A – not applicable

RPD – relative percent difference

TCMX – tetrachloro-meta-xylene

FIGURES

DRAWING NO:
06040611.DWG

DCN: ECSD-RACIV-06-0406
CTO: #0008

APPROVED BY: AE

CHECKED BY: JA
REVISION: 0

DRAWN BY: MD
DATE: 08/22/06

P:\3210-RAC\CTO-0008\DWG\060406\06040611.DWG
PLOT/UPDATE: AUG 17 2006 10:13:36

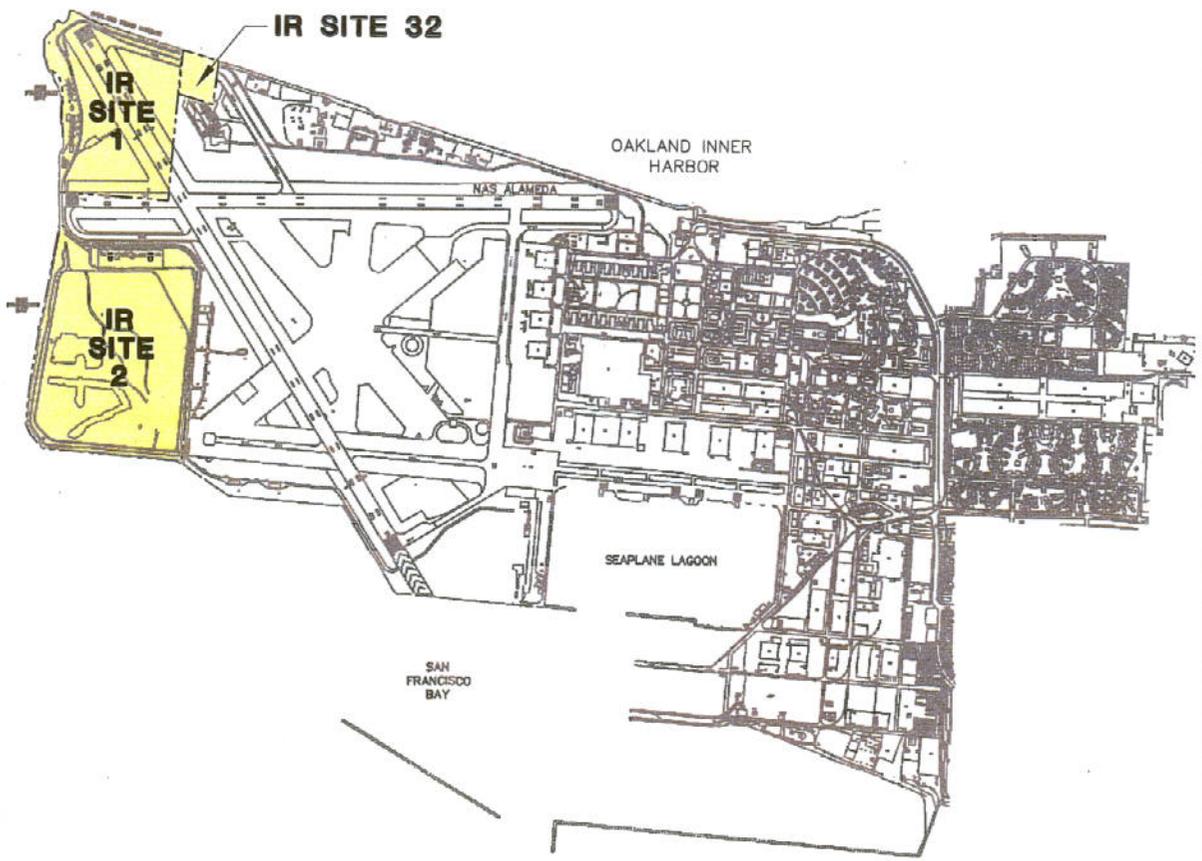
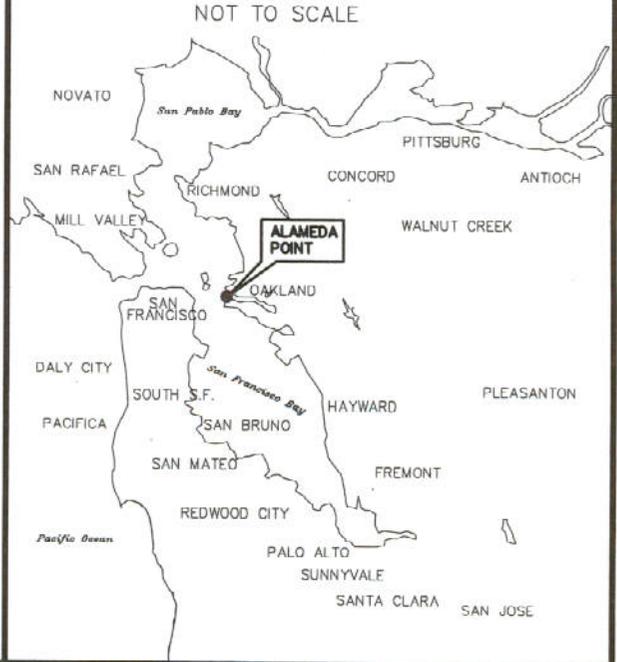


Figure B.1-1
SITE VICINITY MAP

IR SITE 32 AND THE SHORELINES OF IR SITES 1 AND 2
ALAMEDA POINT - ALAMEDA, CA



TETRA TECH EC, INC.

DRAWN BY: MD	CHECKED BY: JA	APPROVED BY: AE	DCN: ECSD-RACIV-06-0406	DRAWING NO:
DATE: 08/22/06	REV: REVISION 0		CTO: #0008	06040612.DWG

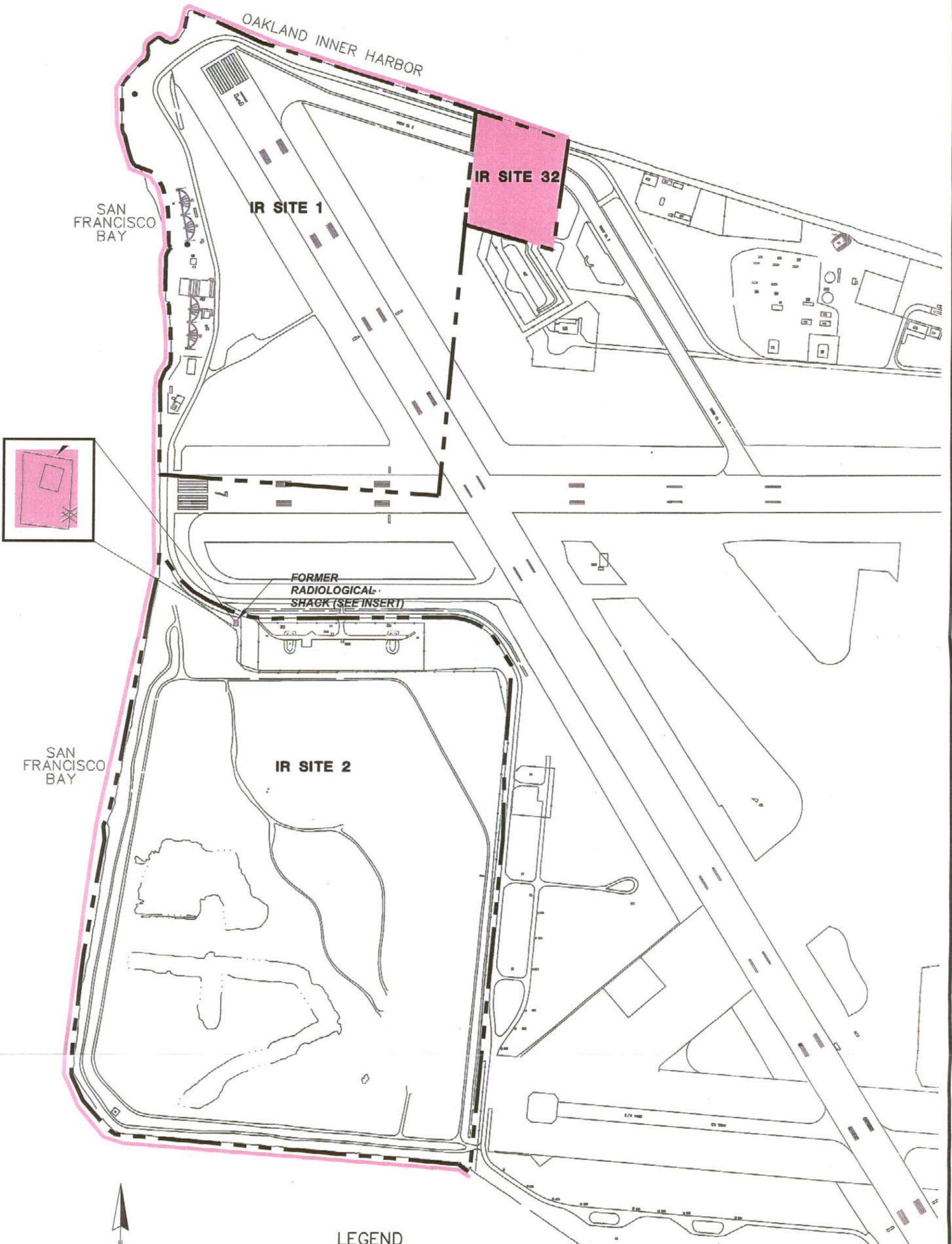


Figure B.1-2
RADIOLOGICAL SURVEY AREAS

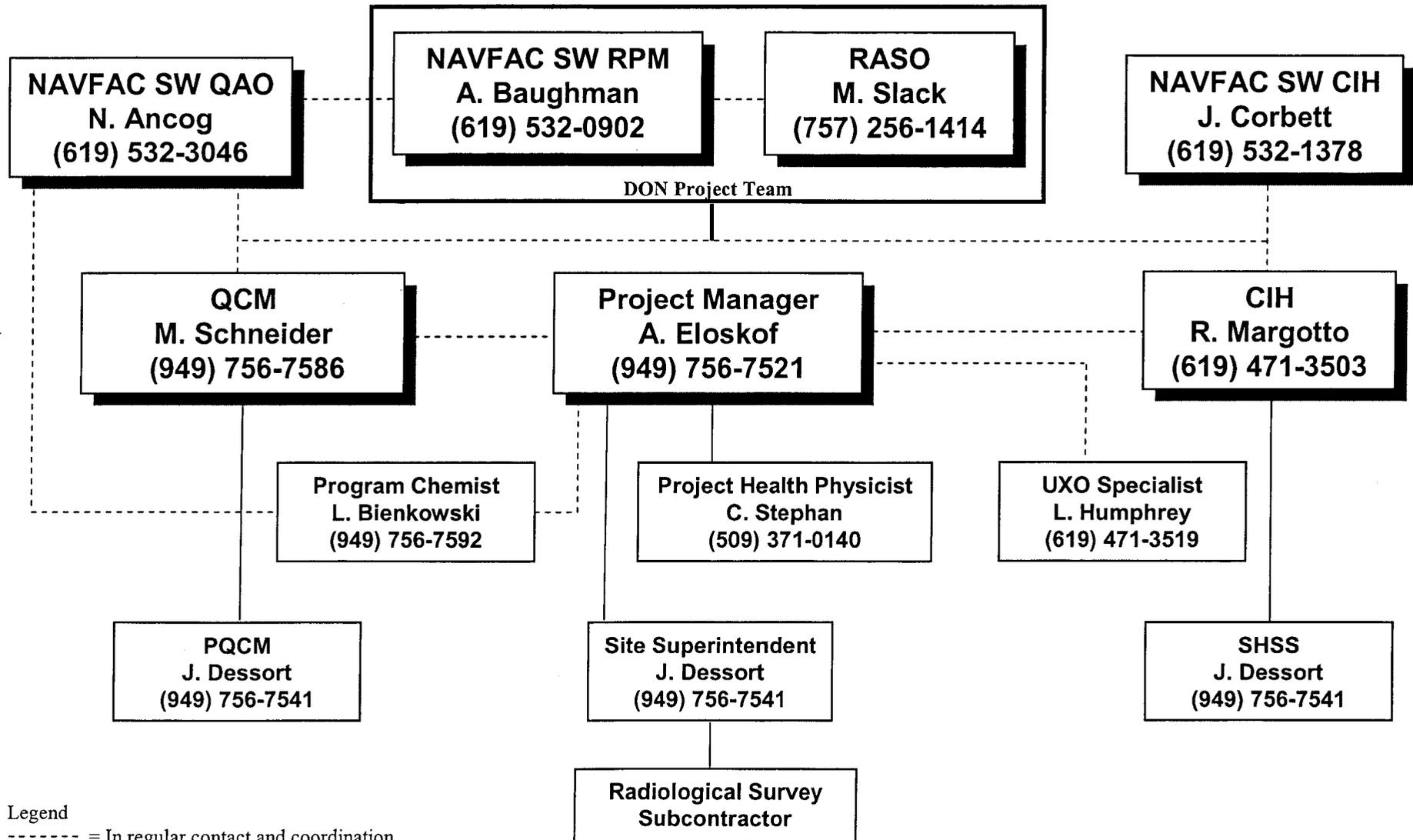
IR SITE 32 AND THE SHORELINES OF IR SITES 1 AND 2
ALAMEDA POINT - ALAMEDA, CA



TETRA TECH EC, INC.

Figure B.7-1

Project Organization Chart



Legend

----- = In regular contact and coordination

———— = Directly reports to above

APPENDIX C
PROJECT CONTRACTOR QUALITY CONTROL PLAN

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-06-D-2201
CTO No. 0008

APPENDIX C
FINAL
PROJECT CONTRACTOR QUALITY CONTROL PLAN

August 22, 2006

**RADIOLOGICAL SURVEY AT
IR SITE 32 AND THE SHORELINES OF IR SITES 1 AND 2
ALAMEDA POINT
ALAMEDA, CALIFORNIA**

DCN: ECSD-RACIV-06-0406



TETRA TECH INC.
1230 Columbia Street, Suite 750
San Diego, CA 92101

Lisa A. Birkhaug for

Mary Schneider
QC Program Manager

TABLE OF CONTENTS

	<u>PAGE</u>
LIST OF TABLES	C.iii
LIST OF FIGURES	C.iii
ABBREVIATIONS AND ACRONYMS	C.iv
1.0 INTRODUCTION	C.1-1
1.1 PURPOSE/SITE BACKGROUND	C.1-1
1.1.1 IR Site 1	C.1-1
1.1.2 IR Site 2	C.1-1
1.1.3 IR Site 32	C.1-2
1.2 SCOPE	C.1-2
2.0 ORGANIZATION AND RESPONSIBILITIES	C.2-1
2.1 PROJECT MANAGER	C.2-1
2.2 QUALITY CONTROL PROGRAM MANAGER	C.2-2
2.3 PROJECT QUALITY CONTROL MANAGER	C.2-2
2.4 PROJECT HEALTH PHYSICIST	C.2-4
2.5 UXO SPECIALIST	C.2-4
2.6 SUBCONTRACTORS AND VENDORS	C.2-5
3.0 SUBMITTALS	C.3-1
3.1 REVIEW OF SUBMITTALS	C.3-1
3.2 SUBMITTAL PROCESS	C.3-2
3.3 REVIEW AND PROCESSING OF SUBMITTALS THAT DO NOT REQUIRE DON APPROVAL	C.3-2
3.4 REVIEW AND PROCESSING OF SUBMITTALS THAT REQUIRE DON APPROVAL	C.3-2
3.5 REVISED SUBMITTALS	C.3-3
4.0 TESTING (OTHER THAN CHEMICAL SAMPLING AND ANALYSIS)	C.4-1
5.0 FIELD INSPECTION PLAN	C.5-1
5.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING	C.5-1
5.2 QC MEETINGS	C.5-2
5.3 PREPARATORY PHASE INSPECTION	C.5-3
5.4 INITIAL PHASE INSPECTION	C.5-3
5.5 FOLLOW-UP PHASE INSPECTION	C.5-4
5.6 ADDITIONAL PREPARATORY AND INITIAL PHASES	C.5-4
5.7 COMPLETION INSPECTION	C.5-4
5.7.1 Field Quality Control Completion Inspections	C.5-5
5.7.2 Pre-final Inspection	C.5-5

TABLE OF CONTENTS
(Continued)

	<u>PAGE</u>
5.7.3 Final Acceptance Inspection.....	C.5-5
5.8 INSPECTION DOCUMENTATION	C.5-5
6.0 DOCUMENTATION	C.6-1
6.1 CONTRACTOR QUALITY CONTROL DAILY REPORT	C.6-1
6.2 CONFERENCE NOTES AND CONFIRMATION NOTES.....	C.6-2
7.0 NONCONFORMANCES.....	C.7-1
7.1 IDENTIFICATION OF NONCONFORMING ITEMS	C.7-1
7.1.1 Condition Requiring Stop Work.....	C.7-1
7.2 NONCONFORMING ITEMS	C.7-1
7.3 DISPOSITION	C.7-1
7.3.1 Field Change Requests and Design Change Notices.....	C.7-2
7.4 CORRECTIVE ACTIONS	C.7-2
8.0 QUALITY MANAGEMENT.....	C.8-1
9.0 REFERENCES	C.9-1

ATTACHMENTS

Attachment 1	Resumes
Attachment 2	Delegation of Authority Letter
Attachment 3	Quality Control Forms
Attachment 4	Submittal Register

LIST OF TABLES

Table C.5-1 Definable Features of Work

LIST OF FIGURES

Figure C.2-1 Project Organization Chart

ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
ATV	all-terrain vehicle
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMT	Construction Management Technician
COC	chain-of-custody
CQC	Contractor Quality Control
CTO	Contract Task Order
DFW	definable feature of work
DON	Department of the Navy
DOT	Department of Transportation
FCR	Field Change Request
FS	Feasibility Study
FWENC	Foster Wheeler Environmental Corporation
GPS	geographic positioning satellite
IR	Installation Restoration
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MEC	munitions and explosives of concern
NAS	Naval Air Station
NAVFAC	Naval Facilities Engineering Command
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NCR	Nonconformance Report
OEW	ordnance and explosive waste
ORR	Operational Readiness Review
OU	Operable Unit
PHP	Project Health Physicist
PjM	Project Manager
PPE	personal protection equipment
PQCM	Project Quality Control Manager
QA	quality assurance

ABBREVIATIONS AND ACRONYMS

(Continued)

QC	quality control
QCM	Quality Control Program Manager
QP	Quality Program
RAC	Remedial Action Contract
RASO	Radiological Affairs Support Office
RI	Remedial Investigation
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SEC	Site Emergency Coordinator
SHSP	Site-specific Health and Safety Plan
SOP	Standard Operating Procedure
TSDF	treatment, storage, and disposal facility
TtEC	Tetra Tech EC, Inc.
TtFW	Tetra Tech FW, Inc.
UFGS	United Facilities Guide Specification
USACE	United States Army Corps of Engineers
UXO	unexploded ordnance

1.0 INTRODUCTION

This Project Contractor Quality Control (CQC) Plan establishes the procedures and methods to be implemented for the specific activities pertaining to the radiological survey at Installation Restoration (IR) Site 32 and the shorelines of IR Sites 1 and 2, Alameda Point, Alameda, California. The Project CQC Plan satisfies both the Department of Navy (DON), Naval Facilities Engineering Command, Southwest (NAVFAC SW) Remedial Action Contract (RAC) IV No. N64273-06-D-2201 requirements with Tetra Tech EC, Inc. (TtEC) quality control (QC) system requirements and the Contract Task Order (CTO) No. 0008 scope of work.

This site-specific Project CQC Plan for CTO No. 0008 is an addendum to the *Final Contractor Quality Control Program Plan* (TtEC, 2006a).

1.1 PURPOSE/SITE BACKGROUND

The purpose of this Project CQC Plan is to establish the specific procedures and methods for field inspections by TtEC staff of the site activities performed during the radiological survey for low-level radiation. The radiological survey at IR Site 32 and the shorelines of IR Sites 1 and 2 will be conducted by a qualified radiological service provider in accordance with the guidance provided in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (Department of Defense [DoD] et al., 2000). Specific radiological QC and quality assurance (QA) requirements applicable to the radiological service provider's work and equipment control are detailed in the Radiological Survey Work Plan for IR Site 32 and the shorelines of IR Sites 1 and 2 (Radiological Survey Work Plan). A brief summary of each site's background is provided below. A detailed description is provided in Section 2.0 of the Radiological Survey Work Plan.

1.1.1 IR Site 1

The DON is currently within the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Feasibility Study (FS) process for a former disposal area located at the northwestern end of Alameda Point, known as IR Site 1, Operable Unit (OU) 3, 1943-1956 Disposal Area. It is proposed that IR Site 1 will be conveyed to the City of Alameda with the intended use as a golf course and regional park trail.

1.1.2 IR Site 2

The DON is currently within the CERCLA Remedial Investigation (RI) and FS process for a former solid waste disposal site located at the southwestern end of Alameda Point known as IR Site 2 West Beach Landfill and associated wetlands. IR Site 2, OU4A is proposed to become part of the wildlife refuge.

1.1.3 IR Site 32

The DON is currently within the CERCLA RI process for IR Site 32. IR Site 32 has no historical indication of being radiologically impacted. However, during a 2004 radiological survey performed under CTO No. 0087, an elevated radiological reading was found to exist along the border between IR Sites 1 and 32. Further radiological investigation is also supported by an incidental elevated radiological reading during the IR Site 32 RI field activities.

1.2 SCOPE

This Project CQC Plan is applicable to all field operations and will be available in the project field office. All work activities will be conducted in accordance with the Radiological Survey Work Plan and the Vegetation Clearance Plan (TtEC, 2006b).

The Project CQC Plan will be implemented for the following activities:

- Mobilization
- Background static measurements
- Environmental resources survey of the areas where work is to be performed
- Vegetation clearance where necessary
- Near 100 percent radiological scan survey (except runway areas and permanent facility structures) of IR Site 32, the Radiological Shack within IR Site 2, and the shorelines of IR Sites 1 and 2
- Dosimetry study at IR Sites 1, 2 and 32
- Subsurface soil sampling and gamma energy analysis for discrete survey areas
- Demobilization

2.0 ORGANIZATION AND RESPONSIBILITIES

This section describes the organization and authority of project personnel performing characterization operations, including subcontractors. The organizational structure, functional responsibilities, personnel qualifications, levels of authority, and lines of communication have been established within the organization to ensure high-quality work. The project organization chart showing the reporting lines for each individual is provided in Figure C.2-1.

All personnel assigned to this project will be qualified and experienced for the type of work they are specifically assigned to perform. The resumes of key QC personnel and the Project Health Physicist (PHP), are presented in Attachment 1. The responsibilities and authorities of project personnel are described in the following paragraphs.

2.1 PROJECT MANAGER

TtEC's Project Manager (PjM), Mr. Abram Eloskof, is responsible for the direction, execution, and successful completion of project tasks to achieve overall project goals. The PjM is also responsible for managing the on-site technical aspects of the project and coordination with the Base Realignment and Closure (BRAC) Environmental Compliance Manager, Resident Officer in Charge of Construction (ROICC), and the DON's Remedial Project Manager (RPM). The PjM has the responsibility and authority to perform the following activities related to the project:

- Coordinating work activities of subcontractors and TtEC personnel and ensuring that all personnel adhere to the administrative and technical requirements of the project
- Monitoring and reporting the progress of work and ensuring that project deliverables are completed on time and within budget
- Ensuring adherence to the quality requirements of the contract, project scope of work, and the Project CQC Plan
- Ensuring effective implementation of the radiological records management program and that the program is in compliance with regulatory requirements
- Ensuring that all work activities are conducted in a safe manner in accordance with the Site-specific Health and Safety Plan (SHSP)
- Serving as the primary contact between DON personnel and TtEC for actions and information related to the work
- Implementing field activities in accordance with the Radiological Survey Work Plan
- Directing support personnel and subcontractors
- Administering site access and communication
- Maintaining worksite, facilities, vehicles, and equipment

- Coordinating work activities of subcontractors and TtEC personnel and ensuring that all personnel adhere to the administrative and technical requirements of the project
- Coordinating and maintaining logistics of all components of on-site tasks, including all personnel and equipment
- Preparing status reports and estimating future scheduling needs
- Preparing daily Contractor Production Reports
- Monitoring and reporting the progress of field activities and ensuring that project deliverables are completed on time and within budget
- Ensuring that all work activities in the field are conducted in a safe manner in accordance with the SHSP

2.2 QUALITY CONTROL PROGRAM MANAGER

The Quality Control Program Manager (QCM), Ms. Mary Schneider, is responsible for the oversight of program QC, including field activities and chemical/radiological data acquisition. The duties of the QCM include:

- Establishing and maintaining the QC Plan for the program (TtEC, 2006a).
- Working directly with the Program Manager and the DON to ensure implementation of the Final CQC Program Plan (TtEC, 2006a).
- Coordinating quality-related matters across all projects and resolving quality concerns.
- Providing quality-related direction and training to the Project Quality Control Manager (PQCM) and others performing quality-related functions.
- Having the authority to suspend project activities if quality standards are not maintained.
- Interfacing with the DON including the NAVFAC SW QA Officer on quality-related issues.
- Performing reviews of audit and surveillance reports.
- Implementing the DON technical directives relating to quality.

2.3 PROJECT QUALITY CONTROL MANAGER

The PQCM, Ms. Jennifer Dessort, reports to the PjM and is responsible for coordinating, directing, implementing, and supervising all site activities. In addition, Ms. Dessort is responsible for overall management of project QC and coordinates with the QCM. An appointment letter assigning the PQCM for implementation of the QC program is provided in Attachment 2. The PQCM's resume is presented in Attachment 1. The PQCM will be on site at all times during field activities.

The duties of the PQCM as they apply to this project include:

- Ensuring that all fieldwork activities are performed in accordance with the TtEC corporate procedures, technical specifications, Radiological Survey Work Plan, and applicable professional standards.
- Directing support personnel and subcontractors.
- Administering site access and communication.
- Maintaining worksite, facilities, vehicles, and equipment.
- Coordinating and maintaining logistics of all components of on-site tasks, including all personnel and equipment.
- Preparing status reports and estimating future scheduling needs.
- Preparing daily Contractor Production Reports.
- Monitoring and reporting the progress of field activities and ensuring that project deliverables are completed on time and within budget.
- Ensuring that all work activities in the field are conducted in a safe manner in accordance with the SHSP.
- Assures performance of daily checks of the survey instruments.
- Maintaining field QC log.
- Providing oversight of fieldwork activities performed by subcontractors.
- Providing and maintaining an effective QC system for all field activities.
- Preparing the CQC Daily Report.
- Ensuring that the three phases of inspection (preparatory, initial, and follow-up) are implemented for all definable features of work (DFWs).
- Ensuring that all required tests and inspections are performed and the results reported.
- Attending required meetings, including the kickoff meeting, all weekly QC meetings, pre- and post-construction site inspections, and other scheduled meetings.
- Issuing and maintaining Field Change Requests (FCRs) and Nonconformance Reports (NCRs) for all project activities.
- Maintaining a NCR log that describes all NCRs. The log will be maintained for each week during the project. If no NCRs were issued during a particular week, the column entitled "No NCR's For Week Ending" will be filled in with the week ending date. A sample NCR form and NCR log are included in Attachment 3.
- Maintaining the Submittal Register (Attachment 4).
- Stopping work that is not in compliance with the contract.

2.4 PROJECT HEALTH PHYSICIST

The PHP, Cliff Stephan, is responsible for implementing, directing, and supervising all radiological project-related activities. The PHP is responsible for:

- Assisting in the development of the SHSP and approving the plan.
- Assisting in identifying project radiological analyses needs and provide technical support in subcontractor selection.
- Providing health physics guidance on an as-needed basis.
- Providing radiological control/protection technician services, if required.
- Directing and assisting Radiological Control Technicians and project personnel in proper completion of radiological records.
- Conducting required radiological safety training.
- Reviewing and approving project field procedures that involve the handling of radioactive materials or access to radiological areas.
- Ensuring timely and thorough review of records, in accordance with the Radiological Records SOP (Appendix D-9 of the Radiological Survey Work Plan), prior to approval.
- Approving records with verifiable signature and date once records meet the quality standards as described in the Radiological Records SOP (Appendix D-9 of the Radiological Survey Work Plan).
- Conducting radiation incident investigations.
- Conducting radiological project inspections.
- Conducting data assessment.

2.5 UXO SPECIALIST

The Unexploded Ordnance (UXO) Specialist, Lance Humphrey, is responsible for implementing, directing, and supervising inspection and certification activities for any munitions and explosives of concern (MEC) and MEC-related materials encountered. A MEC comprehensive surface clearance program was conducted at IR Site 1 in June 2001 (Foster Wheeler Environmental Corporation [FWENC], 2002a) and included removal of ordnance-related materials. A surface sweep for MEC was performed at IR Site 2 in 2002. An ordnance and explosive waste (OEW) characterization was conducted (Tetra Tech FW, Inc. [TtFW], 2004). In addition to these surface characterization activities within IR Site 2, a time-critical removal action that excavated OEW to a depth of 1 foot from the Possible OEW Burial Site was also performed in 2002 (FWENC, 2002b). An MEC sweep of IR Site 32 has not been conducted. The DON has directed that a UXO representative be on call during the radiological survey and present on site during sampling activities. The duties of the UXO Specialist include:

- Ensuring that MEC-related fieldwork activities (if required) are performed in accordance with the TtEC corporate procedures and applicable professional standards.
- Giving ordnance safety briefings.
- Providing oversight of fieldwork activities performed by subcontractors.
- Conducting daily field inspections as required by applicable professional standards.
- Having overall responsibility and accountability for all MEC-handling activities, if required.
- Acting as the Site Emergency Coordinator (SEC), a specific MEC-related function, if required.
- Conducting surveillance activity of encountered OEW if required.
- Conducting other inspection/audit activities as directed by the PQCM.
- Completing reports and other documentation as directed by the PQCM.

2.6 SUBCONTRACTORS AND VENDORS

The subcontractors for this project will include a land surveyor, a geophysical subcontractor, a radiological testing and surveying subcontractor, an analytical laboratory, and a licensed and certified radiochemistry laboratory. The subcontractors are required to provide labor, material, and equipment necessary to conduct their respective services as directed by the PQCM or designee. Subcontractors and vendors will be required to meet the requirements of all aspects of the Radiological Survey Work Plan including, but not limited to, this Project CQC Plan, the Sampling and Analysis Plan (SAP), the SHSP, and the requirements of all approved procedures, SOPs, and contract provisions. TtEC will monitor, oversee, and make on-site observations and inspections of work in progress to determine if the subcontractor's work is proceeding in accordance with these plans.

Subcontractor personnel are responsible for maintaining a daily log of the project activities they perform and for providing information needed to complete the CQC Daily Report. All inspection records, including inspection reports, deficiency reports, and reinspections of corrective actions, will be documented by the PQCM.

3.0 SUBMITTALS

This section describes the review and approval process of submittals. In addition, TtEC will institute and maintain a submittal register (Attachment 4) to track submittals from issuance to approval. A list of required submittals will be developed at the initiation of project activities and revised as necessary. Submittals will be scheduled, reviewed, certified, and managed in accordance with the procedures defined in this section.

Standard Unified Facilities Guide Specification (UFGS) Submittal titles are as follow:

- SD-01 Pre-construction Submittals
- SD-02 Shop Drawings
- SD-03 Product Data
- SD-04 Samples
- SD-05 Design Data
- SD-06 Test Reports
- SD-07 Certificate
- SD-08 Manufacturer's Instructions
- SD-09 Manufacturer's Field Reports
- SD-10 Operation and Maintenance Data
- SD-11 Closeout Submittals

The submittal descriptions are described in Section 1.1.2 of the UFGS 01330 [Naval Facilities Engineering Command (NAVFAC), 2003]. The title list does not infer that they are all applicable to the DON's scope of work for this project.

3.1 REVIEW OF SUBMITTALS

Submittals will be reviewed to ensure completeness, accuracy, and contract compliance. Submittal of a certification will be inspected and approved by the PQCM for conformance to the project specifications or certification criteria. All items will be checked and approved by the PQCM or designated representative. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review and approval by the PQCM, or designee, prior to acceptance. Approved submittals will be stamped, signed, or initialed, and dated. During the preparatory phase of the QC inspections, the PQCM or designee will ensure that all materials and equipment have been tested and approved. No field activities will be performed without the required approval of applicable submittals.

3.2 SUBMITTAL PROCESS

Required submittals will be submitted to the DON and project personnel as determined by the distribution schedule. Each submittal will have a unique document control number. All possible attempts will be made to schedule submittals to allow for sufficient review and approval time. However, certain submittals will require accelerated processing to maintain the schedule.

A transmittal form will accompany each submittal. Each transmittal will be identified with:

- The contract and CTO number
- Name and address of the submitting organization
- Date of submittal
- Description of item being submitted, including reference to specification section (if applicable)
- Approval of submitting organization indicating conformance to the requirements

The PQCM will update the submittal log regularly.

3.3 REVIEW AND PROCESSING OF SUBMITTALS THAT DO NOT REQUIRE DON APPROVAL

Material submitted for review by the PQCM will indicate that it either conforms to established requirements or does not conform to established requirements. The PQCM will advise submitter of the results of the review. The submittal log will be updated to indicate status.

Conforming submittals will be transmitted to project and DON personnel as determined by the distribution schedule. All items sent to the DON will use a transmittal form that will indicate each item transmitted, the date reviewed by the PQCM, and its review status.

Nonconforming submittals will be returned to the submitter for correction, resolution of comments, and re-submittal.

3.4 REVIEW AND PROCESSING OF SUBMITTALS THAT REQUIRE DON APPROVAL

Material submitted for review by the PQCM will be signed to indicate that it conforms to requirements.

Submittals reviewed by the PQCM will then be transmitted to the DON in accordance with the project distribution schedule for review and approval. All items sent to the DON will use a transmittal form that will indicate each item transmitted, the date reviewed by the PQCM, and its review status. Upon completion of review, the ROICC will either return the transmittal form to the PQCM for further action, or accept the submittal as complete.

The PQCM will advise the submitter of the results of the review in writing and include any comments. The submittal log will be updated to indicate status.

Nonconforming submittals may be returned to the submitter for correction, resolution of comments, and re-submittal, if required.

3.5 REVISED SUBMITTALS

Revised submittals will be logged, reviewed, and processed in a manner identical with the initial submittal.

4.0 TESTING (OTHER THAN CHEMICAL SAMPLING AND ANALYSIS)

The Radiological Survey Work Plan describes the performance of the radiological survey for site characterization. Testing materials or equipment is not required. Operational checks on the radiological sensors are required for a MARSSIM survey (DoD et al., 2000) and will be conducted by the radiological service provider. Operational check procedures and SOPs are provided in Section 5.5.3 and Appendix D of the Radiological Survey Work Plan, respectively.

5.0 FIELD INSPECTION PLAN

This section discusses the DFWs for all field activities, including that of subcontractors and suppliers, the inspection process, and the required meetings to ensure compliance with the contract. The DFWs establish the measures required to verify both the quality of work performed and compliance with specified requirements and include inspecting materials and workmanship before, during, and after each DFW. The DFWs for this project include the following:

- Mobilization
- Environmental resources survey of the areas where work is to be performed
- Vegetation clearance where necessary
- Land and geophysical survey
- Background area static measurements
- Near 100 percent radiological scan survey (except runway areas and permanent facility structures) of IR Site 32, the Radiological Shack within IR Site 2, and the shorelines of IR Sites 1 and 2
- Subsurface soil sampling and gamma energy analysis for discrete survey areas
- Dosimetry study at IR Sites 1, 2 and 32
- Waste profiling and off-site disposal of decontamination water
- Demobilization

Detailed descriptions of each DFW and the required phases of control are presented in Table C.5-1. Refer to the Radiological Survey Work Plan for additional requirements for the radiological screening and Vegetation Clearance Plan (TtEC, 2006b) for associated clearance requirements.

Project CQC includes implementing the following three control phases for all aspects of the work specified:

- Preparatory phase
- Initial phase
- Follow-up phase

5.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to start of site work, the PjM will conduct a kickoff meeting. Group attendance will include the RPM, ROICC, the ROICC's Construction Management Technician (CMT) and the BRAC Environmental Compliance Manager to discuss the QC program required by this contract. The

purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used, administration of on-site and off-site work, coordination of the field activities, production, and the PQCM duties with the ROICC. At a minimum, the TtEC personnel required to attend the meeting shall include the PjM, PQCM, and the PHP. Minutes of the meeting shall be prepared by the PQCM and signed by the PjM and the DON's RPM and/or ROICC or designated representative.

5.2 QC MEETINGS

After the start of field activities, the PQCM will conduct QC meetings at a frequency of once per week or as required by the ROICC. The meetings will be held at the project site and will be attended by the ROICC, ROICC CMT, and the PQCM/Site Health and Safety Specialist. The PQCM will notify the ROICC at least 48 hours in advance of each meeting. The following shall be accomplished at each meeting:

- Review the minutes of the previous meeting.
- Review the schedule.
 - Work or testing accomplished since last meeting
 - Rework items identified since last meeting
 - Rework items completed since last meeting
- Review the status of submittals.
 - Submittals reviewed and approved since last meeting
 - Submittals required in the near future
- Review the work to be accomplished in the following 2 weeks and documentation required. Schedule the three phases of control and testing.
 - Establish completion date for rework items
 - Required preparatory phase inspections
 - Required initial phase inspections
 - Required follow-up phase inspections
 - Required testing
 - Status of off-site work or testing
 - Required documentation
- Resolve QC and production problems.
- Address items that may require revisions to the Project CQC Plan.

5.3 PREPARATORY PHASE INSPECTION

The PQCM will conduct preparatory phase inspections prior to starting the DFWs listed in Table C.5-1. These inspections shall include:

- Review of the Radiological Survey Work Plan, SOPs, and drawings.
- Ensuring that all required procurement for supplies and services are approved.
- Ensuring that provisions have been made to provide required control inspection.
- Ensuring that all personnel have the required trainings/certifications needed to perform the work.
- An examination of the work area to ensure that all required preliminary work has been completed and is in compliance with the approved Radiological Survey Work Plan requirements.
- A physical examination of the required materials and equipment to ensure that they are properly delivered to the site, conform to specifications, and are properly stored.
- A review of the appropriate Activity Hazard Analysis (AHA) to ensure that safety requirements are met.
- A discussion of procedures for performing the work, including potential repetitive deficiencies.
- Documentation of workmanship standards for the particular phase of work.
- Ensuring that the Project CQC Plan for the work to be performed has been accepted by the DON.

The PjM, DON RPM, and ROICC shall be notified at least 2 working days in advance of each preparatory phase activity. This phase shall include a meeting conducted by the PQCM and attended by any personnel involved in performing the DFW.

The issues discussed during the preparatory phase meetings will be documented on the Preparatory Inspection Checklist (Attachment 3). The PQCM will direct personnel performing work activities as to the acceptable level of workmanship required.

5.4 INITIAL PHASE INSPECTION

An initial inspection will be performed at the beginning of a DFW and will include:

- A check of preliminary work to ensure that it is in compliance with contract requirements.
- A review of the Inspection Checklist documenting results of the preparatory meeting.
- Verification of full contract compliance, including required control inspections.
- Establishment of the required level of workmanship and verification to ensure that work meets minimum acceptable standards.

- Resolution of all differences.
- A check of safety requirements to include compliance with and upgrading of the SHSP and AHA.
- A review of the AHA with project personnel.

The PjM, DON RPM, and ROICC shall be notified at least 2 working days in advance of each initial phase activity. The PQCM will document initial inspections for each item using the Initial Inspection Checklist (Attachment 3) and attach it to the Daily CQC Report. The exact location of the initial phase inspection will be indicated for future reference and comparison with follow-up inspections.

An initial phase inspection will be conducted each time a new crew arrives on site or any time acceptable specified quality standards are not being met.

5.5 FOLLOW-UP PHASE INSPECTION

During the completion of a particular work feature, follow-up inspections will be conducted to ensure continued compliance with contract requirements. The frequency of the follow-up inspections will depend on the extent of the work being performed on each particular feature. Each follow-up inspection will be documented on the Follow-up Inspection Checklist (Attachment 3), which will be attached to the Daily CQC Report. A final follow-up check will be conducted on any completed work phase prior to the commencement of a subsequent phase. Any deficiencies will be corrected prior to starting additional phases of work or will be identified on a list of items that do not conform to the specified requirements or are incomplete.

5.6 ADDITIONAL PREPARATORY AND INITIAL PHASES

The PQCM may conduct additional preparatory and initial inspections on the same DFWs under the following circumstances:

- 1) If the quality of ongoing work is unacceptable as determined by the PQCM, PjM, DON RPM, and ROICC
- 2) If there are substantial changes in the staff, on-site supervision, or work crew
- 3) If work on a DFW is resumed after a substantial period of inactivity
- 4) If other problems develop

5.7 COMPLETION INSPECTION

Completion inspections will be performed as summarized in this section.

5.7.1 Field Quality Control Completion Inspections

The PQCM will conduct a detailed inspection prior to the pre-final inspection, when all of the work or an increment of work is deemed to be substantially complete. The work will be inspected for conformance to plans, specifications, quality, workmanship, and completeness. The PQCM will prepare an itemized list of work not properly completed, inferior workmanship, or work that does not conform to plans and specifications. The list will also include outstanding administrative items, such as record (as-built) drawings. The list will be included in the QC documentation and submitted to the PjM following the inspection and will specify an estimated date for correction of each deficiency. The completion inspection will be documented on the Completion Inspection Checklist (Attachment 3) and attached to the Daily CQC Report.

5.7.2 Pre-final Inspection

The PjM or designee will conduct the pre-final inspection. The DON RPM, ROICC, PQCM, and other primary management representative(s), as applicable, will attend. The PjM will schedule the pre-final inspection in response to notification from the PQCM prior to the planned inspection date. The PQCM is required to verify at this time that all specific items previously identified as being unacceptable, along with all remaining project work, will be complete and acceptable by the scheduled date for the pre-final inspection. At this inspection, the ROICC will develop a list of incomplete and/or unacceptable work performed under the contract and will provide this list to TtEC.

5.7.3 Final Acceptance Inspection

The PjM will schedule the final acceptance inspection based on notification from the PQCM of readiness. The DON RPM, ROICC, PQCM, and other primary management representative(s), as applicable, will attend. Notification will be provided prior to the planned final acceptance inspection date and must include verification that all specific items previously identified as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

5.8 INSPECTION DOCUMENTATION

The PQCM is responsible for the maintenance of the inspection records. Inspection records will be legible and clearly provide all necessary information to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the ROICC. All inspection records will be made available to the DON.

6.0 DOCUMENTATION

Preparation, review, approval, and issuance of documents affecting quality will be controlled to the extent necessary to determine that the documents meet specified requirements. Project documents, which may be controlled, include the following:

- Meeting minutes, conference notes, and confirmation notes
- Submittal Register
- Inspection documentation
- Contractor Production Report
- Daily CQC Report
- Material inspection and shipping logs
- NCRs
- NCR log
- FCRs
- Rework Items List
- Photograph log
- Field logbooks

6.1 CONTRACTOR QUALITY CONTROL DAILY REPORT

The PQCM is responsible for maintenance of current records of QC operation, activities, and tests performed, including the work of subcontractors and suppliers. The records will include factual evidence that required QC activities and tests were performed. A Daily CQC Report will be completed by the PQCM to document construction activities covered by the Project CQC Plan. A Contractor Production Report will also be completed daily by the PQCM. These documents will include the following:

- Contractor/subcontractor(s) and their area of responsibility
- Operating equipment, with hours worked, idle, or down for repair
- Work performed that day, giving location, description, and by whom
- Test and/or control activities performed with results and references to SOPs/plan requirements, including the control phase (preparatory, initial, follow-up) and deficiencies (along with corrective action)
- Material received, with statement as to its acceptability and storage
- Submittals reviewed, with contract reference, by whom, and action taken
- Off-site surveillance activities, including actions taken
- Job safety evaluations stating what was checked, results, and instructions or corrective actions

- A list of instructions given/received and conflicts in plans and/or SOPs
- Contractor's verification statement
- Site visitors/purpose, deviations from plans, difficulties, and resolution

The records will indicate a description of trades working on the project, the number of personnel working, weather conditions encountered, and any delays encountered. Both conforming and nonconforming features will be covered with a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original of this report shall be furnished to the ROICC on the first workday (or an acceptable schedule established by ROICC during kickoff meeting) following the date covered by the report. Reports need not be submitted for days during which no work is performed. At a minimum, one report shall be prepared and submitted for every 7 days of no work and on the last day of a no-work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work will summarize work for that day only. Reports will be signed and dated by the PQCM and other appropriate personnel, including subcontractors responsible for completion of activities. The report will include copies of test reports and copies of reports prepared by all subordinate QC personnel. Samples of the Daily CQC Report and Contractor Production Report are included in Attachment 3.

6.2 CONFERENCE NOTES AND CONFIRMATION NOTES

In addition to other required documentation, the PQCM is responsible for taking notes and preparing the reports of all conferences. Conference notes will be typed and the original report furnished to the DON within 5 days after the date of the conference for concurrence and subsequent distribution to all attendees. At a minimum, this report will include the following:

- Date and place the conference was held
- List of attendees, including name, organization, and telephone number
- Written comments presented by attendees attached to each report with the conference action noted: "A" for an approved comment, "D" for a disapproved comment, "W" for a comment that has been withdrawn, and "E" for a comment that has an exception noted
- Comments made during the conference and decisions affecting criteria changes
- Conference notes that augment the written comments

The PjM is also responsible for providing a record of all discussions, verbal directions, telephone conversations, and so forth in which TtEC personnel or their representatives participate on matters relating to this contract and work. These records, entitled "Confirmation Notices," will be numbered sequentially and will fully identify participating personnel, subject discussed, and any conclusions reached. The PjM, or his designee, will forward a reproducible copy of the confirmation notices to the DON RPM and ROICC within 5 working days.

7.0 NONCONFORMANCES

The PQCM documents any work or materials not conforming to the technical specifications or project/contract requirements on a NCR. The NCR will detail the nonconforming condition, the recommended corrective action(s), and the disposition of the corrective action(s). Qualified representatives from engineering, QA, and construction will review the NCR and either accept or reject the recommended corrective action or disposition. The NCR will remain open until the nonconforming condition has been satisfactorily resolved and verified by QC inspection staff and PQCM. Upon receipt of notification of detected nonconformance, NCRs for each item will be completed.

7.1 IDENTIFICATION OF NONCONFORMING ITEMS

Items identified as nonconforming will be documented in accordance with the TtEC corporate Quality Program (QP)-11 procedure, Control of Nonconforming Conditions. Copies of completed NCRs will be sent to the ROICC.

7.1.1 Condition Requiring Stop Work

If corrective actions are insufficient, resolution cannot be reached, or results of prior work are indeterminate, work may be stopped. A Stop Work Order can only be issued by the PjM and the PQCM in writing. If there is a disagreement between the PQCM and the PjM, the difference will be brought to the attention of the QCM until resolution is achieved.

The conditions of the Stop Work Order will be described in detail on a Rework Items List in addition to the NCR to allow evaluation of the problem(s) and proper corrective action(s). Work will not continue until the Stop Work Order has been rescinded by the individual who authorized it.

7.2 NONCONFORMING ITEMS

The nonconforming items will be controlled to prevent inadvertent use. All items noted as nonconforming will be clearly identified and segregated from acceptable items when practical as described in the QP -11 procedure.

7.3 DISPOSITION

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or reinspecting. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific instruction, or a FCR.

7.3.1 Field Change Requests and Design Change Notices

Site personnel shall document changes to the approved plans in the field through the FCR form. At a minimum, the following information will be documented in the FCR form:

- Project name
- CTO number
- FCR number
- Documents to which a change is requested (including revision number if applicable)
- Description of the item or condition for which the change is requested
- Reason for the change
- Recommended disposition
- Cost and schedule implication of the change, if any
- Approval of disciplines if changes involve risk-sensitive items in that discipline
- Approval of the PjM, PQCM, Project Environmental and Safety Manager, and QCM

7.4 CORRECTIVE ACTIONS

On detection of a nonconforming condition, the PQCM will immediately take corrective action. The procedure for identification, analysis and implementation of corrective action is described in the QP-12 procedure, Corrective Action.

8.0 QUALITY MANAGEMENT

In addition to the required QC field inspections, the TtEC QP requires a quality management overview of the site QA/QC Program implementation. The PQCM will perform regular internal QC checks on the site implementation of the QA/QC Program. Reports of any deficiencies will be reported to the PjM for corrective action.

Inspections will be performed and checked for the following:

- Possession and use of approved procedures, standards, and project specifications
- Conformance with appropriate procedures, standards, and instructions
- Thoroughness of performance
- Identification and completeness of documentation generated during performance

9.0 REFERENCES

- Department of Defense (DoD), Department of Energy (DOE), Nuclear Regulatory Commission (NRC), and U.S. Environmental Protection Agency (EPA). 2000. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*. NUREG-1575. August.
- Foster Wheeler Environmental Corporation (FWENC). 2002a. *Final Ordnance and Explosives Waste/Geotechnical Characterization Report (RI Addendum, Volume III)*. Ordnance and Explosives Waste Characterization, and Geotechnical and Seismic Evaluations at Installation Restoration Site 1, Alameda Point, Alameda, California. November.
- _____. 2002b. *Final Time-Critical Removal Action Closeout Report, Time-Critical Removal Action at Installation Restoration Site 2 Alameda Point, Alameda, California*. November.
- Naval Facilities Engineering Command (NAVFAC). 2003. *Unified Facilities Guide Specification (UFGS) 01330, Submittal Procedures*. January.
- Tetra Tech EC, Inc. (TtEC). 2006a. *Draft Program Construction Quality Management Plan*. DCN: ECSD-RACIV-06-0025. January 13.
- _____. 2006b. *Draft Vegetation Clearance Plan*. Radiological Survey at IR Site 32 and the Shorelines of IR Sites 1 and 2. Alameda Point, Alameda, California. May.
- Tetra Tech FW, Inc. (TtFW). 2004. *Final Ordnance and Explosives Waste/Geotechnical Characterization Report, Ordnance and Explosives Waste Characterization, Time-Critical Removal Action, and Geotechnical and Seismic Evaluations at Installation Restoration Site 2, Alameda Point, Alameda, California*. January.

TABLES

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Mobilization	<ul style="list-style-type: none"> • Verify that ORR has been conducted. • Verify that coordination and mutual understanding meeting has been conducted. • Verify that the RPM and ROICC have been notified about mobilization. • Verify that list of field personnel has been submitted. • Verify that all site personnel, including subcontractors, have submitted health and safety documentation. • Verify that applicable procurements for products and subcontracted services have been awarded and that submittals are accepted. • Verify list of vehicles and insurance records. • Verify that Site-specific Health and Safety Plan has been approved and reviewed by each field member. • Review Radiological Survey Work Plan and AHAs. • Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. • Verify that equipment inspection has been completed. 		<ul style="list-style-type: none"> • Verify establishment of equipment staging areas. • Verify that permit conditions are followed. • Verify that the site is properly posted and secured. • Verify that site activities are being photographed. • Inspect investigation-derived waste storage area construction. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that site-approved ingress and egress routes are used. • Verify that mobilization is being conducted in accordance with the Radiological Survey Work Plan. 		<ul style="list-style-type: none"> • Verify that the site is properly posted and secured. • Verify that utilities are disconnected or relocated as necessary. • Conduct ongoing inspection of material and equipment. • Inspect equipment decontamination pad construction. • Inspect investigation-derived waste storage area construction. • Verify that site-approved ingress and egress routes are used. • Verify that mobilization is being conducted in accordance with the Radiological Survey Work Plan. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Mobilization (continued)	<ul style="list-style-type: none"> • Verify that radiological training has been provided and documented. • Verify that the TtEC Biologist has conducted site orientation for protection of natural resources. • Review equipment decontamination procedure. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that site ingress and egress routes have been approved. 					
Environmental resources survey	<ul style="list-style-type: none"> • Review project documents and verify that all meetings have been conducted and documented and that all notifications have been made. • Verify that all site personnel including contractors have submitted health and safety documentation. • Review traffic access and base security requirements. 		<ul style="list-style-type: none"> • Verify that photographs of the site are taken prior to any site work and submitted to the ROICC. • Verify that all site conditions are properly documented. • Conduct environmental resource survey. • Verify that project documents have been reviewed and will be followed. 		<ul style="list-style-type: none"> • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Review health and safety requirements. • Verify that traffic and security requirements are being followed. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Vegetation clearance	<ul style="list-style-type: none"> • Verify that applicable procurements for products and subcontracted services have been awarded and submittals approved. • Verify that all site personnel, including subcontractors, have submitted health and safety documentation. • Verify that Site-specific Health and Safety Plan has been approved and reviewed by each field member. • Review AHA(s) for this activity. • Review project documents and verify that all meetings have been conducted and documented and that all notifications have been made. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that site ingress and egress routes have been approved. • Verify that the TtEC Biologist has conducted site orientation for sensitive species. • Verify proper PPE with crew. 		<ul style="list-style-type: none"> • Verify field documentation (field logbook, etc.). • Check for compliance with the Site-specific Health and Safety Plan and with task AHA(s). • Verify that equipment delivered to the site is as identified in the Radiological Survey Work Plan and procurement documents. • Verify that decontamination is in accordance with the Radiological Survey Work Plan and Site-specific Health and Safety Plan. • Verify that crews are avoiding restricted areas and identifying sensitive species in the work area, if applicable. • Verify that photographic documentation is occurring. • Verify that PPE is being screened for radiological contamination. • Verify that PPE drums are being stored properly. 		<ul style="list-style-type: none"> • Verify PPE screening procedure. • Verify field documentation (field logbook, etc.). • Verify that vegetation clearance is conducted according to the Radiological Survey Work Plan. • Verify that temporary facilities have been installed as per the Radiological Survey Work Plan and appropriate specifications. • Check for compliance with the Site-specific Health and Safety Plan and with task AHA(s). 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Land and geophysical survey	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended mobilization preparatory meeting or verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Verify that land surveyor is licensed in California. • Verify that the DON has provided the most current utility maps. • Verify that survey instrument certification is current and in good condition. • Review AHA(s) for this activity. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that the biased sampling locations have been approved by the RASO. • Verify that each sample location is clearly delineated for the geophysical survey. 		<ul style="list-style-type: none"> • Verify that surveyor has the correct control point information. • Verify that survey is conducted in accordance with approved Radiological Survey Work Plan and subcontractor scope of work. • Verify proper PPE use. • Verify that site activities are being photographed. • Verify that sensitive locations at the site are delineated and that work crews are aware of restricted areas. 		<ul style="list-style-type: none"> • Verify that deliverables are received as required in scope of work. • Verify that utilities are marked in field. • Verify that each control point and sample location are clearly delineated. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Background area static measurements	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended mobilization preparatory meeting or verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Review scope of work. • Review the Radiological Survey Work Plan for this activity. • Verify instrument calibration. 		<ul style="list-style-type: none"> • Review grid and instrument reading location layout. • Verify equipment calibration. • Verify that crew uses appropriate PPE and uses proper disposal practices. • Verify that field logbook is filled out. • Verify that site activities are being photographed. 		<ul style="list-style-type: none"> • Verify that static measurements are recorded. • Plot map static measurement results. • Verify that radiological data results are sent to the PHP. • Verify that site activities are being photographed. • Verify that crew uses appropriate PPE and use proper disposal practice. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Conduct radiological survey	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended mobilization preparatory meeting and verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Verify that background activity value has been established. • Verify that proper radiological survey equipment is on site and is in working order. • Verify that the control points are properly marked and staked. • Verify that the boundary of the radiological survey area is marked. • Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. • Verify instrument calibration. • Review AHAs. • Review Radiological Survey Work Plan, appendices and SOPs. • Verify that the crew members using ATVs have been approved and meet USACE requirements. • Verify that ATVs meet USACE requirements. • Verify that man lift operators have a minimum of 2 years of experience operating man lifts or similar equipment. 		<ul style="list-style-type: none"> • Verify that site activities are being photographed. • Verify that proper radiological equipment and techniques are used. • Verify that equipment calibration is checked and recorded. • Verify that survey data are downloaded and plotted and that questionable areas are flagged and resurveyed. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that crew members use appropriate PPE and follow USACE regulations for use of ATVs. • Verify that crew disposes of PPE as required. • Verify that PPE is screened for radiological contamination and containerized as appropriate. • Verify that site activities are being photographed. • Verify that radiological survey is being conducted in accordance with the procedure described in Radiological Survey Work Plan. • Verify that radiological records are prepared in accordance with the SOP. 		<ul style="list-style-type: none"> • Continue to inspect ongoing work. • Verify that crew is checking GPS equipment against control points regularly. • Verify that survey data are plotted and map is generated. • Verify that site activities are being photographed. • Verify that radiological survey is being conducted in accordance with the procedure described in Radiological Survey Work Plan. • Verify that data review process is being performed. • Verify that radiological records are being prepared, reviewed and maintained in accordance with the SOP. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Soil sampling	<ul style="list-style-type: none"> • Verify that RASO has approved the biased sampling locations. • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended mobilization preparatory meeting or verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Review scope of work. • Review SAP. • Review control points. • Review AHAs. • Review the Radiological Survey Work Plan and drawings for this activity. • Verify that the sampling materials and equipment are appropriate. • Verify that the radiological survey equipment will be available for soil core screening radiation measurements. • Verify instrument calibration. • Verify that there is adequate equipment and materials to decontaminate sample equipment as necessary and that containment area is established. • Verify that UXO Specialist has appropriate geophysical equipment. 		<ul style="list-style-type: none"> • Review biased sample location approved by the RASO. • Verify that UXO Specialist has cleared sample location. • Verify that soil samples are collected. • Verify equipment calibration. • Verify that radiological measurements and readings on soil core are collected and that readings are recorded. • Verify that crew uses appropriate PPE and use proper disposal practices. • Verify that field sample logbook is filled out. • Verify that sample collection and labeling are in accordance with SAP. • Verify that samples are shipped using proper procedures for samples with radiological contamination. • Check COCs. • Verify that daily decontamination water is properly containerized and controlled. • Verify that decontamination water stored is in approved waste containment area. • Verify that site activities are being photographed. • Verify that radiological screening is being conducted in accordance with procedure described in Radiological Survey Work Plan. • Verify that radiological records are prepared in accordance with the SOP. 		<ul style="list-style-type: none"> • Verify that land survey of boreholes is recorded. • Plot map of boreholes and static measurement results. • Verify that COC is sent to Project Chemist. • Verify that samples are shipped using proper procedures for low-level radiological samples. • Verify that laboratory personnel follow SAP for homogenizing soil sample. • Verify that radiological data results are sent to the PHP. • Verify that site activities are being photographed. • Verify that crew uses appropriate PPE and use proper disposal practices. • Verify that radiological screening is being conducted in accordance with procedures described in the Radiological Survey Work Plan. • Verify that radiological records are prepared, reviewed and maintained in accordance with the SOP. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Conduct gamma spectroscopy survey	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that crew members attended mobilization preparatory meeting and verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Verify that background activity value has been established. • Verify that proper radiological survey equipment is on site and is in working order. • Verify that the control points are properly marked and staked. • Verify that the boundary of the radiological survey area is marked. • Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. • Verify instrument calibration. • Review AHAs. • Review Radiological Survey Work Plan, appendices and SOPs. 		<ul style="list-style-type: none"> • Verify that site activities are being photographed. • Verify that proper radiological equipment and techniques are used. • Verify that equipment calibration is checked and recorded. • Verify that crew dispose of PPE as required. • Verify that PPE is screened for radiological contamination and containerized as appropriate. • Verify that site activities are being photographed. • Verify that radiological survey is being conducted in accordance with procedures described in Radiological Survey Work Plan. • Verify that radiological records are prepared in accordance with the SOP. 		<ul style="list-style-type: none"> • Continue to inspect ongoing work. • Verify that survey data are generated and stored. • Verify that site activities are being photographed. • Verify that radiological survey is being conducted in accordance with procedures described in Radiological Survey Work Plan. • Verify that data review process is being performed. • Verify that radiological records are being prepared, reviewed and maintained in accordance with the SOP. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Dosimetry study	<ul style="list-style-type: none"> Verify that the RPM and ROICC have been notified. Verify that work crew members attended mobilization preparatory meeting and verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). Verify that the location for each dosimeter is identified and marked. Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. Review Radiological Survey Work Plan, appendices and SOPs. 		<ul style="list-style-type: none"> Verify placement of dosimeters. Verify that dosimeter locations are being photographed. Verify that radiological survey is being conducted in accordance with procedure described in the Radiological Survey Work Plan. 		<ul style="list-style-type: none"> Periodically (e.g., once a month) inspect dosimeter locations to ensure that dosimeter is still present. Verify that dosimeters are collected and sent off site for analysis. Verify that dosimeter reports are received from laboratory. Verify that radiological records are being prepared, reviewed and maintained in accordance with the SOP. 	
Waste profiling	<ul style="list-style-type: none"> Verify that the RPM and ROICC have been notified. Verify that work crew members attended appropriate site training (see Mobilization above). Verify that testing services will be available for the testing of the waste samples. Review the SAP, Radiological Survey Work Plan, and AHAs. Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. Verify that there is adequate equipment and materials to decontaminate sample equipment as necessary. 		<ul style="list-style-type: none"> Verify that all samples of materials for proposed disposal have been submitted and approved. Verify decontamination of sampling equipment. Verify sample collection and labeling of samples. Verify DOT labeling. Inspect field documentation. 		<ul style="list-style-type: none"> Verify that test data has been collected in compliance with the Radiological Survey Work Plan and SOPs. Inspect field documentation. 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Transportation and disposal of decontamination Water	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that TSDF and transporter are approved by TtEC regulatory personnel. • Verify that TtEC regulatory personnel prepare and review all profiling documents. • Verify that all analyses are available for profiling of wastes to disposal/recycling facilities. • Verify that haulers of wastes have documentation of licenses, as stated in the Radiological Survey Work Plan. • Verify that all approvals are in place with the DON. • Verify that wastes have been scheduled for transportation to disposal/recycling facilities. • Confirm schedule with DON for signing of shipping documents. 		<ul style="list-style-type: none"> • Verify that all reviewed profile documents are submitted to the DON. • Verify that equipment and materials are in place for the loading and transportation of wastes. • Verify that adequate personnel are available for traffic control. • Check for compliance with the Site-specific Health and Safety Plan and with task AHA(s). 		<ul style="list-style-type: none"> • Verify that all documents have been approved by the DON and by the proposed disposal/recycling facilities. • Verify that the shipping documents have been signed by the DON. • Verify that copies of all waste documentation are being maintained in project files. • Check for compliance with the Site-specific Health and Safety Plan and with task AHA(s). 	

TABLE C.5-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Demobilization	<ul style="list-style-type: none"> • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended appropriate site training (see Mobilization above). • Review AHAs. • Review Radiological Survey Work Plan. • Verify that PPE is available and meets requirements of the Site-specific Health and Safety Plan. • Verify that there is adequate equipment and materials to decontaminate tools, facilities, and equipment as necessary. • Review records management procedure. 		<ul style="list-style-type: none"> • Verify equipment and tool decontamination. • Verify decontamination procedure. • Verify certification of decontamination. • Verify that site activities are being photographed. • Verify site cleanup. Activity shall include repair of any construction-related damage. • Verify that all project records are complete. 		<ul style="list-style-type: none"> • Conduct ongoing inspection of demobilization activities. • Verify that site activities are being photographed. • Verify that decontamination is conducted in accordance with Radiological Survey Work Plan. • Verify that all project records are shipped to the Program Management Office in San Diego. 	

Notes:

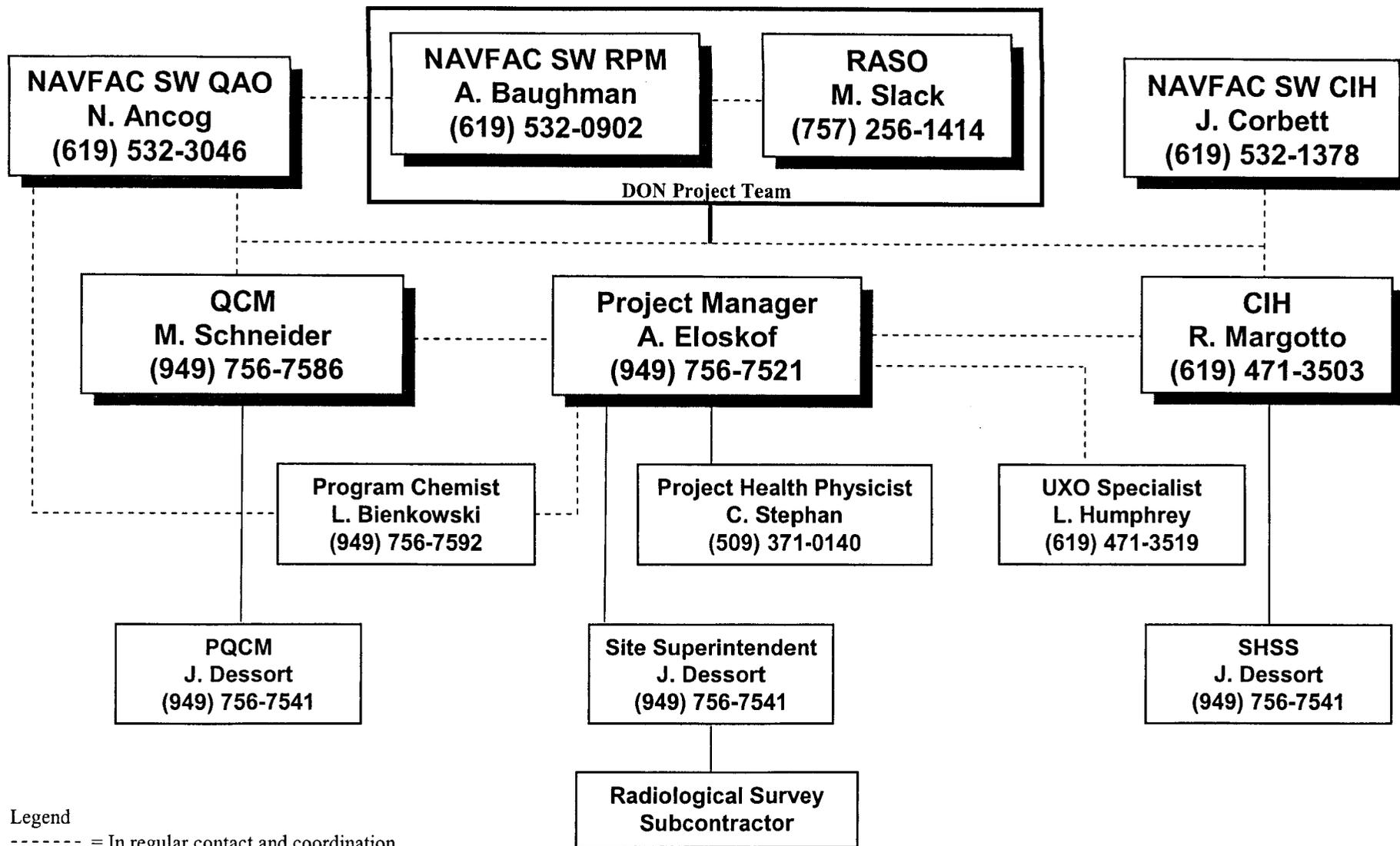
AHA – Activity Hazard Analysis
 ATV – all-terrain vehicle
 COC – chain-of-custody
 DON – Department of the Navy
 DOT – Department of Transportation
 GPS – geographic positioning satellite
 ORR – Operational Readiness Review
 PHP – Project Health Physicist
 PPE – personal protective equipment
 RASO – Radiological Affairs Support Office
 ROICC – Resident Officer in Charge of Construction
 RPM – Remedial Project Manager

SAP – Sampling and Analysis Plan
 SOP – Standard Operating Procedure
 TSDF – treatment, storage, and disposal facility
 TtEC – Tetra Tech EC, Inc.
 USACE – United States Army Corps of Engineers
 UXO – unexploded ordnance

FIGURES

Figure C.2-1

Project Organization Chart



Legend

- - - - - = In regular contact and coordination
- = Directly reports to above

ATTACHMENT 1

RESUMES

JENNIFER A. DESSORT, REA

Environmental Safety and Quality Specialist

EXPERIENCE SUMMARY

Ms. Dessort has over 13 years of broad-based experience in regulatory intensive industries. Her strengths are in the areas of Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), facility closure, regulatory interpretation, compliance assessment, and operations management. She is a regulatory compliance specialist for Tetra Tech EC in support of projects conducted under the Naval Facilities Engineering Command Southwest, Remedial Action Contract. Currently provides field support as a Quality Control Inspector/Environmental Safety Specialist performing construction quality control and health and safety supervision for multiple federal facilities undergoing remedial activities mandated under CERLCA and BRAC.

Ms. Dessort currently supports the Department of Energy (DOE) National Nuclear Security Administration Second Line of Defense program, which involves extensive field engineering involvement at OCONUS (overseas) security sites. These projects typically involve civil and structural engineering oversight in order to field design and construct nuclear detection systems. Project specific involvement includes supervising construction activities, health and safety oversight, construction quality control and overseas logistics support. She also provides various Superfund commercial clients with task management and quality assurance, specializing in landfill cap closure construction, and compliance support for landfill operations/maintenance activities including leachate collection and management, storm water management, landfill gas migration control and treatment, and cover system maintenance. She is a recognized company trainer, and conducts RCRA, DOT and OSHA required training for site and home office employees.

EDUCATION

B.S. (Bachelor of Science), Zoology, University of Oklahoma, 1996
Certificate, Environmental Site Investigation & Remediation, University California at Irvine
Certificate, Hazardous Waste Management, University of California at Irvine

REGISTRATIONS/CERTIFICATIONS

California Registered Environmental Assessor (REA) 07314

TRAINING

8-Hour OSHA Hazardous Waste Health and Safety Refresher Training – March 2006
Waste Management Employee Training Program, 40 CFR 265.16 – October 2004
DOT/HM-126F Training – October 2004
Red Cross First Aid/Adult CPR Certification – May 2005
Project Management Training (PM 200) – October 2002
UXO Identification and Safety Training – August 2002
USACOE Contractor Quality Management Training – June 2002
Loss Control Training – July 2001
Project Management Training (PM 100) – August 1999
8-HOUR Confined Space Training – October 1996
Blood Bourne Pathogen Training – May 1995
40-Hour OSHA Hazardous Waste Health and Safety Training, HAZCO – June 1995



JENNIFER A. DESSORT, REA

Environmental Safety and Quality Specialist

Cal-EPA, Department of Toxic Substance Control, Region 4:

Corrective Action Training/USEPA, Region 9

California Environmental Quality Act (CEQA) Training/Office of Policy and Environmental Analysis

Hazardous Material Laboratory Training/Cal-EPA, Berkeley

RCRA Facility Assessment Training/USEPA, Region 9

TETRA TECH EC EXPERIENCE

Quality Control Inspector/Environmental Safety Supervisor, May 2005 – November 2005

Operating Industries Inc. (OII) Superfund Site, Monterey Park, CA

In charge of field operations, directing work activities, coordinating equipment, materials and manpower (craft employees and union). Completed civil phases of annual landfill repair supporting post-closure operation and maintenance of the 143 acres Superfund Site. Project civil repairs included slope grid rolling, cap contour and shaping, bench road demolition and repair. As quality control inspector responsible for documenting construction repair in accordance with final design requirements and construction specifications. Also performed client coordination, budget tracking, health and safety documentation.

Quality Control Inspector/Environmental Safety Supervisor, March 2004 – Present

Eleni Project, Department of Energy Second Line of Defense contract, Classified Foreign Country

Performed construction quality control and health and safety program oversight for multiple construction sites within confidential foreign country during installation of nuclear detection systems for the U.S. Department of Energy (DOE). Conducted quality control inspections on all aspects of civil construction in accordance with design criteria and technical specifications for multiple installation sites. Responsibilities included ensuring construction activity compliance in accordance with contract project specifications and drawings, and completion of construction completion reports for multiple installation sites. Assisted office and site engineering leads with constructability issues; identification and documentation of construction deficiencies, preparation of Field Quality Control Reports to ensure that construction activities complied with project specifications and drawings; identification and documentation of final acceptance items for installation sites prior to subcontractor work release, conducting quality and mechanical completion reviews with DOE oversight personnel prior to site acceptance.

Implemented health and safety plan for this project and trained in-country personnel and subcontractors on the plan. Managed site environmental safety supervisors for multiple construction sites throughout the country. Traveled to multiple installation sites to monitor and assist the project site safety program. Specific health and safety responsibilities include supervision of equipment operators and craft personnel during construction activities, providing safety briefings; generation of activity hazard analyses and site specific health and safety plans, site inspections, and general field observations to verify compliance with site specific health and safety plans. Other duties included, but were not limited to, hazard identification and health risk analysis; implementing procedures and programs to eliminate risk to site personnel, initiating required changes to the Site Health and Safety Plan; implementing site control measures; maintaining health and safety field log books; providing summaries of field operations and progress to the Program Health and Safety Manager; instructing all site personnel in the terms and conditions of the Site Health and Safety Plan; and exercising stop work authority when warranted by conditions in accordance with project plans.

Environmental Safety and Quality Specialist, May 1999 – Present

Southwest Division, Naval Facilities Engineering Command, Remedial Action Contract (RAC)

Regulatory Compliance Specialist for BRAC administered federal-facility CERCLA and FFA sites



JENNIFER A. DESSORT, REA

Environmental Safety and Quality Specialist

including former Alameda Air Station, Hunters Point Naval Shipyard, Naval Station San Diego, Moffet Federal Airfield, Barstow Marine Corps Logistics Base, Marine Corps Base Camp Pendleton, Naval Fuel Depot Point Molate and Naval Air Facility El Centro. Supported facilities as a regulatory compliance specialist providing development of Remedial Actions and Design documents, CERCLA Record of Decision, Remedial Investigation/Feasibility Studies (RI/FS), Preliminary Assessment/Site Inspections (PA/SI), Storm water Management Plans, Spill Prevention and Control Plans, Permitting Applications and Documents, Permitting Feasibility Analyses, among other environmental documents and studies.

Environmental Safety and Quality Specialist, August 2004 – Present **Confidential Client, Huntington Beach, CA**

Provide regulatory oversight, guidance and preparation of a Consolidated Contingency Plan and Emergency Response Plan to provide personnel and subcontractors with a single guidance for emergency preparedness and response during remediation activities associated with a 15-acre California Superfund site. Site was previously utilized to landfill wastes from the petroleum industry.

Task Order Coordinator, January 2004 – April 2004

U.S. Department of Energy, Second Line of Defense Program, Evaluation of Components for Detector Systems, Richland, WA

Assisted health physicist discipline lead with evaluation of radiological detector components, assessing current state of detector technology, and, making recommendations for component and system improvements in Second Line of Defense nuclear material detection monitors. Also responsible for subcontract SOW preparation, vendor procurement, cost controls and budget allocation, SOW change order tracking and client notification, DOE meeting participation, technical assistant to discipline leads for deliverables, finalization of deliverables, and document control.

Environmental Safety and Quality Specialist, September 2002 – October 2002 **Alcoa Demolition Project, Troutdale, OR**

Provided compliance support during dismantlement and demolition of former aluminum smelting facility. Implemented the Environmental Management Plan, the Storm Water Pollution Control Plan, the Release Prevention Control and Countermeasures Plan, and confirmational Sampling and Analysis Plan. Provided technical expertise and guidance for all aspects of environmental regulations and compliance including waste management, storm water management, and hazardous materials management.

Task Manager, April 2001 – February 2004

Former Naval Air Station Alameda, Alameda CA

Assistant Project Manager for Alameda Sites 1 and 2, Unexploded Ordnance (UXO) and Geotechnical/Seismic Characterization. Project included 14 acre UXO clearance of the former Naval Air Station Alameda. Specific responsibilities included proposal estimating, SOW preparation, generation of work plans, vendor procurement, cost controls and resource allocation, SOW change order tracking and client notification, health and safety documentation, QC oversight for field leads, meeting participation, regulatory compliance, document control, client notification, meeting participation, regulatory compliance and document control.

Project Coordinator, May 2000 – June 2002

Operating Industries Inc. (OII), Monterey Park, CA

Project Coordinator for CERCLA ROD mandated Long Term Groundwater Monitoring-Final Remedy and First Area Specific Evaluation at the OII Landfill Super Fund Site. Responsibilities included work plan generation in accordance with EPA consent decree, subcontract SOW preparation, vendor procurement and surveillance, cost controls and budget allocation, SOW change order tracking and



JENNIFER A. DESSORT, REA
Environmental Safety and Quality Specialist

client notification, monitoring equipment operators and craft personnel during construction activities ensuring safety compliance, health and safety documentation, quality control oversight for field leads, regulatory meeting participation, regulatory compliance interpretation, technical assistant to discipline leads for deliverables, finalization of deliverables, document control.

Task Manager, May 2000 –April 2001

Former Naval Fuel Depot Point Molate, Richmond, CA

Assistant Project Manager for Point Molate removal action and landfill cap construction included estimating, SOW preparation, generation of work plans, vendor procurement, budget tracking and allocation, SOW change order tracking and client notification, health and safety documentation, QC oversight for field leads, regulatory meeting participation, regulatory compliance, document control.

Construction Quality Control Inspector, July 1999 – June 2001

New CURE Inc., Operating Industries Incorporated Landfill (OII), Monterey Park, CA

Conducted quality control inspections on all aspects of landfill cap construction in accordance with design requirements and technical specifications at the OII Landfill Super Fund Site. Construction activities included placement of a moncover cap and installation of leachate, gas collection system and landfill gas treatment system at the OII Landfill in Monterey Park, CA. Responsibilities included monitoring fill and road base material placement; inspecting installation of drainage systems; inspecting rebar and concrete placement; inspecting delivery of materials including: geosynthetic products, piping, fill materials and landscaping products; performing vacuum and pressure tests for gas and liquid lines; inspecting installation of an irrigation system; verifying design grades for fill and storm drain placement; inspecting placement of geosynthetic clay liner (GCL), geogrid, PVC and HDPE liners, geotextile fabric, and geocell materials; performing well and probe abandonment, inspection of electrical and mechanical equipment for installation of a landfill gas treatment system.

PREVIOUS EXPERIENCE

HAZCO, Division of Fluid Tech, Inc.

Project Environmental Scientist, April 1995 – February 1999

National Training Center, Fort Irwin; Hazardous Waste Services and Remediation Contract, Fort Irwin, CA

Responsible for providing adherence to contract terms and conditions, federal acquisition regulations and deliverable submittals for the National Training Center, Fort Irwin Hazardous Waste Services and Remediation Contract funded under the Army Corps of Engineers, Sacramento, California District. Performed as task manager, waste characterization chemist, compliance specialist, health and safety officer, and quality construction inspector during remediation and construction activities.

Region 4 (DTSC) Facility Permitting Intern, April 1992 – July 1994

California Environmental Protection Agency Department of Toxic Substances Control

Responsibilities included assisting the Facility Permitting Chief for Region 4 and project managers with review and compilation of facility closure reports, operation plans and RCRA facility assessments for TSD facilities under the jurisdiction of DTSC Region 4. Direct involvement with regulatory surveillance and enforcement inspections at TSD facilities. Prepared public notice and California Environmental Quality Act (CEQA) documentation for facilities filing for permit status. Implemented coordination between state and local agencies for public participation projects required by the state of California under CEQA/NEPA guidelines.



PROFESSIONAL REFERENCES

West Coast Engineering Department
Tetra Tech EC, Inc.
ABID LOAN, Senior Discipline Lead,
Southwest Engineering Division
1940 East Deere Avenue
Santa Ana, CA 92705
(949) 756-7514

Environmental Health and Safety Division
Tetra Tech EC, Inc.
PHIL BARTLEY, Corporate Director,
Environmental Health and Safety Services
3200 George Washington Way
Richland, WA 99352
(509) 372-5818

Second Line of Defense Program
Tetra Tech EC, Inc.
TERRY BAUMGARTNER, Quality Control Manager,
SLD Program
3200 George Washington Way
Richland, WA 99352
(509) 372-5818

Permitting Department
California Environmental Protection Agency
Department of Toxic Substances Control – Glendale
ROBERT SENGA, Permitting Unit Chief
1011 Grandview Avenue
Glendale, CA 91210
(818) 551 - 2840

Hazardous Waste Division
City Of Oxnard Fire Department
JOE ZARNOCH, Hazmat Supervisor
5 "C" Street
Oxnard, CA
(805)-385-7657

RELATED COMPANY INFORMATION

Office Location: Santa Ana
TtEC Hire Date: 6/14/1999
Years with Other Firms: 7
Daytime Telephone: 949-756-7541
Cell Telephone: 949-466-7573
E-mail Address: jennifer.dessort@tteci.com



ATTACHMENT 2
DELEGATION OF AUTHORITY LETTER



TETRA TECH EC, INC.

May 17, 2006

Ms. Jennifer Dessort
Tetra Tech EC, Inc.
1940 E. Deere Ave., Suite 200
Santa Ana, CA 92705

Subject: Project Quality Control Manager

Reference: Contract No. N62473-06-D-2201,
Environmental Remediation Contract, Contract Task Order (CTO) No. 0008,
Alameda Point, Alameda, California

Dear Ms. Dessort:

In accordance with the terms of Tetra Tech EC, Inc. (TtEC) Contract No. N62473-06-D-2201, this letter notifies you of your appointment as the Project Quality Control Manager for CTO No. 0008 at Alameda Point.

As the designated Project Quality Control Manager, you will be responsible for managing the site-specific quality control requirements in accordance with the approved plans. You will be responsible for conducting quality control meetings, performing the three phases of control, and performing submittal review. You will be required to be present during all field activities to ensure that any testing is conducted in accordance with approved plans. In addition, you will be required to prepare the necessary quality control certification and documentation.

You have the authority and responsibility for suspending work when conditions adverse to quality are identified and for directing the correction of all nonconforming work.

This letter is effective immediately until modified by the Quality Control Program Manager with concurrence of the TtEC Project Manager, the NAVFAC SW Remedial Project Manager, and the Resident Officer in Charge of Construction.

Sincerely,

Tetra Tech EC, Inc.

Mary Schneider

Quality Control Program Manager

cc: A. Eloskof, Project Manager



1230 Columbia Street, Suite 500, San Diego, CA 92101
Tel: 619.234.8690 Fax: 619.234.8591
www.tteci.com

ATTACHMENT 3
QUALITY CONTROL FORMS

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE
REPORT
NO

PHASE CONTRACT NO. **0008** CONTRACT TITLE **IR Site 32 and Shorelines of IR Sites 1 and 2, Alameda Point**

PREPARATORY	WAS PREPARATORY PHASE WORK PERFORMED TODAY? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.		
	Schedule Activity No.	Definable Feature of Work	Index #

INITIAL	WAS INITIAL PHASE WORK PERFORMED TODAY? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.		
	Schedule Activity No.	Definable Feature of Work	Index #

FOLLOW-UP	WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	WORK COMPLIES WITH SAFETY REQUIREMENTS? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present	

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)		REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)	
Schedule Activity No.	Description	Schedule Activity No.	Description

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep On-Site, etc.	
Schedule Activity No.	Description

On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT	
Schedule Activity No.	Description

GOVERNMENT QUALITY ASSURANCE MANAGER DATE

CONTRACTOR QUALITY CONTROL REPORT

(CONTINUATION SHEET)
(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

REPORT NO.

PHASE

CONTRACT NO. 0008

CONTRACT TITLE

IR Site 32 and Shorelines of IR Sites 1 and 2,
Alameda Point

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE?

YES

NO

WORK COMPLIES WITH SAFETY REQUIREMENTS?

YES

NO

Schedule
Activity No.

Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification
Section, Location and List of Personnel Present

FOLLOW-UP

REMARKS (Also Explain Any Checklist Item From Above That Was Answered "NO"); Manuf. Rep. On-Site, etc.

Schedule
Activity No.

Description

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

CONTRACT NO
N62473-06-D-2201

TITLE AND LOCATION
IR Site 32 and Shorelines of IR Sites 1 and 2, Alameda Pt

REPORT NO

CONTRACTOR
Tetra Tech EC, Inc.

SUPERINTENDENT/
PQCM

AM WEATHER

PM WEATHER

MAX TEMP (F)

MIN TEMP (F)

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

JOB SAFETY	WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CON'T SHEETS	
	WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
	WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/ HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.)	<input type="checkbox"/> YES	<input type="checkbox"/> NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	
	WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.)	<input type="checkbox"/> YES	<input type="checkbox"/> NO		

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED SAFETY REQUIREMENTS HAVE BEEN MET.

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Submittal #	Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Owner	Description of Construction Equipment Used Today (incl Make and Model)	Arrival	Off Rent Date	Actual Demob Date	Hours Idle	Hours Used	Reason for Idle

REMARKS

_____ DATE _____
CONTRACTOR/SUPERINTENDENT

PREPARATORY PHASE CHECKLIST

(CONTINUED ON SECOND PAGE)

SPEC SECTION

DATE

CONTRACT NO
N62473-06-D-2201

DEFINABLE FEATURE OF WORK

SCHEDULE ACT NO.

INDEX #

PERSONNEL PRESENT	GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES <input type="checkbox"/> NO <input type="checkbox"/>	
	NAME	POSITION
SUBMITTALS	REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES <input type="checkbox"/> NO <input type="checkbox"/>	
	IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED? _____	
	ARE ALL MATERIALS ON HAND? YES <input type="checkbox"/> NO <input type="checkbox"/>	
	IF NO, WHAT ITEMS ARE MISSING? _____	
MATERIAL STORAGE	ARE MATERIALS STORED PROPERLY? YES <input type="checkbox"/> NO <input type="checkbox"/>	
	IF NO, WHAT ACTION IS TAKEN? _____	
SPECIFICATIONS	REVIEW EACH PARAGRAPH OF SPECIFICATIONS. _____	
	DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK. _____	
	CLARIFY ANY DIFFERENCES. _____	
PRELIMINARY WORK & PERMITS	ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.	
	IF NOT, WHAT ACTION IS TAKEN? _____	

TESTING	IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM. _____

	WHEN REQUIRED? _____

	WHERE REQUIRED? _____

SAFETY	REVIEW TESTING PLAN. _____

	HAS TEST FACILITIES BEEN APPROVED? _____

	ACTIVITY HAZARD ANALYSIS APPROVED? YES <input type="checkbox"/> NO <input type="checkbox"/>
	REVIEW APPLICABLE PORTION OF EM 385-1-1. _____
MEETING COMMENTS	NAVY/ROICC COMMENTS DURING MEETING.

OTHER ITEMS OR REMARKS	OTHER ITEMS OR REMARKS:

_____ POCM DATE	

INITIAL PHASE CHECKLIST		SPEC SECTION	DATE
CONTRACT NO N62473-06-D-2201	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
PERSONNEL PRESENT	GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES <input type="checkbox"/> NO <input type="checkbox"/>		
	NAME	POSITION	COMPANY/GOVERNMENT
PROCEDURE COMPLIANCE	IDENTIFY FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY. COORDINATE PLANS, SPECIFICATIONS, AND SUBMITTALS.		
	COMMENTS: _____		
PRELIMINARY WORK	ENSURE PRELIMINARY WORK IS COMPLETE AND CORRECT. IF NOT, WHAT ACTION IS TAKEN?		
WORKMANSHIP	ESTABLISH LEVEL OF WORKMANSHIP.		
	WHERE IS WORK LOCATED? _____		
	IS SAMPLE PANEL REQUIRED? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	WILL THE INITIAL WORK BE CONSIDERED AS A SAMPLE? YES <input type="checkbox"/> NO <input type="checkbox"/>		
	(IF YES, MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE AND DESCRIBE LOCATION OF SAMPLE) _____		
RESOLUTION	RESOLVE ANY DIFFERENCES.		
	COMMENTS: _____		
CHECK SAFETY	REVIEW JOB CONDITIONS USING EM 385-1-1 AND JOB HAZARD ANALYSIS		
	COMMENTS: _____		
OTHER	OTHER ITEMS OR REMARKS		
PQCM		DATE	

COMPLETION INSPECTION CHECKLIST

Date

Report No.

Contract No.: N62473-06-D-2201, CTO No. 0008

Contract Title: IR Site 32 and Shorelines of IR Sites 1 and 2, Alameda Point

Contract Specifications:

Major Definable Features of Work:

A. Open Punchlist Items From Follow-Up Phase Checklist:

	Item	Date of Completion
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

B. New Punchlist Items Noted:

	Item	Date of Completion
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____

C. ROICC NOTIFIED? Yes No

On behalf of Tetra Tech EC, Inc., I certify this activity is completely in accordance with the Contract Documents, based upon the information available to me.

Project Quality Control Manager

NONCONFORMANCE REPORT

		Report No.	
Client or Project:		Drawing No./Spec. No.	
Supplier, Construction QC or Contractor		P.O. No.	
Description of Component, Part or System			
I. Description of Nonconformance <i>(Items involved, specification, code or standard to which items do not comply, submit sketch if applicable)</i>			
Name and Signature of Person Reporting Nonconformance		Title/Company	Date
II. Recommended Disposition <i>(Submit sketch, if applicable)</i>			
Name and Signature of Person Recommending Disposition		Title/Company	Date
III. Evaluation of Disposition by Tetra Tech EC, Inc., Reason for Disposition			
IV. Corrective Action <input type="checkbox"/> Required <input type="checkbox"/> Not Required			
V. <input type="checkbox"/> Engineering	<input type="checkbox"/> QA/QC	<input type="checkbox"/> Construction	<input type="checkbox"/> Other
Name <i>(Signature)</i>	Name <i>(Signature)</i>	Name <i>(Signature)</i>	Name <i>(Signature)</i>
Date	Date	Date	Date
<input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> Accepted with Comments	<input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> Accepted with Comments	<input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> Accepted with Comments	<input type="checkbox"/> Accepted <input type="checkbox"/> Rejected <input type="checkbox"/> Accepted with Comments
VI. Verification of Disposition <input type="checkbox"/> Required <input type="checkbox"/> Not Required			
By	Signature	Title	Date

MATERIALS INSPECTION CHECKLIST

Date

Report No.

Contract No.: N62473-06-D-2201, CTO No. 0008

Contract Title: IR Site 32 and Shorelines of IR Sites 1 and 2

Contract Specifications:

Material/Equipment Certifications:

Preparatory Site Conditions:

Contract Variance:

Comments:

Attendees:

QC Representative

Date

PQCM

Date

INSTRUCTIONS

Enter submittal number.
Check applicable CQC clause.

CONSTRUCTION CONTRACTOR – PART I

From: Construction contractor's name and address.
To: Designer's name and address or ROICC/REICC as applicable.

Enter contract number.

Enter title of contract and location.

Describe item being transmitted. A separate form must be used for each set of catalog cuts or shop drawings. Include name of manufacturer, catalog sheets, drawing no., name of item, and number of copies forwarded.

Check submittal for record or approval purposes.

Type date and name.

Sign original and one.

Distribution (as applicable to CQC clause):

Send to designer: original and four transmittal forms with the seven copies of catalog cuts or shop drawings.
When factory inspection is required, send eight copies.

Send to ROICC/REICC: one carbon copy of form.

Send to ROICC/REICC (CQC): Original and three copies of catalog cuts or shop design.

Retain one copy for your files.

DESIGNER (A&E CONTRACTOR, SOUTHWESTNAVFACENGCOM) OR ROICC RESPONSIBLE FOR DESIGN – PART II

From: Designer's name and address.
To: ROICC/REICC and address.

Enter recommended action (i.e., approval recommended or disapproved, with appropriate comments).

Type date and name.

Sign original and one.

Distribution:

Send to ROICC/REICC: original and three copies with six (or seven when factor inspection is required) copies of catalog cuts or shop drawings.

Retain one copy of form and one copy of cuts or drawings for your files.

ROICC OR REICC – PART III

From: ROICC or REICC and address.
To: Construction contractor's name and address.

Enter action taken (i.e., approved subject to, etc.).

Type date and name.

Sign original and one.

Distribution:

Send to construction contractor: original with three copies of cuts or drawings

Send to ROICC one carbon copy of form with one copy of cut or drawings.

Retain two copies of form and two copies of cuts or drawings: one for field use and one for ROICC/REICC file.

NOTE: When factory inspection is required, forward one approved copy of cuts or drawings to the ROICC, Construction Division. Cover transmittal should state the information is forwarded for factory inspection.



FIELD CHANGE REQUEST FORM

Contract No. N62473-06-D-2201	CTO No. 0008	Field Change Request Form No. FCRF-
Location		Date

RE: Drawing No. _____	Title _____
Specification Section _____	Title _____
Other _____	

Description (items involved, submit sketch, if applicable)

Reason for Change

Recommended Disposition (submit sketch, if applicable)



FIELD CHANGE REQUEST FORM

Contract No. N62473-06-D-2201	CTO No. 0008	Field Change Request Form No. FCRF-	
Additional Details			
Will this change result in a contract cost or time change? <input type="checkbox"/> Yes <input type="checkbox"/> No			
Estimate of contract cost or time charge (if any) _____			
Preparer (signature)	Date	Preparer's Title	Site Superintendent/PQCM (Signature)
Disposition			
<input type="checkbox"/> Approved.			
<input type="checkbox"/> Not approved (give reason). _____			
TtEC Engineer (signature) (if engineering related)	Date	TtEC Project Manager (signature)	Date
<input type="checkbox"/> Comments (attached) <input type="checkbox"/> No Comments		<input type="checkbox"/> Comments (attached) <input type="checkbox"/> No Comments	
TtEC PESM (signature)	Date	TtEC Scientist (signature) (if science related)	Date
<input type="checkbox"/> Comments (attached) <input type="checkbox"/> No Comments		<input type="checkbox"/> Comments (attached) <input type="checkbox"/> No Comments	
TtEC QC Program Manager (signature)	Date		
<input type="checkbox"/> Comments (attached) <input type="checkbox"/> No Comments			

Distribution: Original to Project File, Copy to Site File, Project Manager, DON RPM, DON ROICC, PQCM, QCM

PHOTOGRAPH LOG SHEET

Date Submitted

Roll No.

Contract No.: N62473-06-D-2201, CTO No. 0008

Contract Title: IR Site 32 and the Shorelines of IR Sites 1 and 2, Alameda Point

Photographer:

Frame	Date	Time	Location/Grid No.	Description/Work No.	Notes
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					
31.					
32.					
33.					
34.					

ATTACHMENT 4
SUBMITTAL REGISTER

SUBMITTAL REGISTER

TITLE AND LOCATION			CONTRACTOR								CONTRACT NO.						
IR SITE 32 AND SHORELINES OF IR SITES 1 AND 2, ALAMEDA POINT			Tetra Tech EC, Inc.								N62473-06-D-2201, CTO No. 0008						
A C T I V I T Y	T R A N S M I T T A L	S P E C I F I C A T I O N	P A R A G R A P H	CONTRACTOR SCHEDULE DATES				CONTRACTOR ACTION		APPROVING AUTHORITY				M A I L E D T O C O N T R A C T O R A P P R A U T H	R E M A R K S		
				C L A S S I F I C A T I O N	S C H E D U L E D A T E	A P P R O V A L N E E D E D B Y	M A T E R I A L N E E D E D B Y	A C T I O N C O D E	D A T E O F A C T I O N	D A T E F W D T O A P P R A U T H D A T E R C D F R O M C O N T R	D A T E F W D T O O T H E R R E V I E W E R	D A T E R C D F R O M O T H E R R E V I E W E R	A C T I O N C O D E			D A T E O F A C T I O N	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
			SD-01, PRE-CONSTRUCTION SUBMITTAL														
			SD-02, SHOP DRAWINGS (or equivalent)														
			SD-03, PRODUCT DATA														
			SD-04, SAMPLES														
			SD-05, DATA DESIGN														
			SD-06, TEST REPORTS														
			Summittal Register Log		G												
			(Daily Contractor Quality Control Reports (noted on Submittal Register Log only and does not require a separate cover sheet))		G												
			SD-07, CERTIFICATES														
			SD-08, MANUFACTURER'S INSTRUCTIONS														
			SD-09, MANUFACTURER'S FIELD REPORTS														
			SD-10, OPERATION AND MAINTENANCE DATA														
			SD-11, CLOSEOUT SUBMITTALS														
			Pre Final Inspection Report & Punchlist		G												
			Final Inspection Report & Punchlist		G												

APPENDIX D

STANDARD OPERATING PROCEDURES

- Appendix D-1 SOP 1, Gamma Spectroscopy System**
- Appendix D-2 SOP 2, Laser-assisted Ranging and Data System
(Vehicle- and Backpack-based) Procedures**
- Appendix D-3 SOP 3, Preparation of Portable Radiation and
Contamination Survey Meters and Instruments for
Field Use**
- Appendix D-4 SOP 4, Sampling Procedures for Radiological Surveys**
- Appendix D-5 SOP 5, Release of Materials and Equipment from
Radiologically Controlled Areas**
- Appendix D-6 SOP 6, Radiation and Contamination Surveys**
- Appendix D-7 SOP 7, Radiological Protective Clothing Selection,
Monitoring, and Decontamination**
- Appendix D-8 SOP 8, Decontamination of Equipment and Tools**
- Appendix D-9 SOP 9, Radiological Records**

APPENDIX D-1

SOP 1, GAMMA SPECTROSCOPY SYSTEM

APPENDIX D-1

STANDARD OPERATING PROCEDURE (SOP) 1

GAMMA SPECTROSCOPY SYSTEM

1.0 PURPOSE AND SCOPE

This procedure describes the setup, operation, and disassembly of the Gamma Spectroscopy System.

This procedure applies to personnel operating a Gamma Spectroscopy System to acquire spectral data from which reports and records are generated. Use of the system to provide information only is also performed according to this procedure and the instrument operating manual.

2.0 DEFINITIONS

Background Count—A spectrum collected while all samples or items of interest are absent from the detector's field of view. During background counts, the radiation detector responds to radiation from sources other than the samples or items to be measured. The energies and intensities of background radiation in a background count are assumed to be present during subsequent measurements of samples, items, or containers.

Calibrate—To determine, by measurement or comparison with a standard, the correct value of each scale reading of a meter or the correct value for each setting of a control knob or switch.

Calibration Reference—A radioactive standard with known activity and gamma-ray emission rates, which is used to determine if the instrument is working within prescribed limits.

Full Width at Half-Maximum—The width of a peak at half of the maximum peak height with the baseline removed.

Quality Control (QC) Count—An energy spectrum collected to quantitatively assess the response of the Gamma Spectroscopy System to known radiations emitted from a radiation check source.

Sample Count—An energy spectrum collected with the sample, item, or container of interest that is appropriately placed in the detector's field of view.

3.0 PROCEDURE

3.1 Precautions

Use the following precautions when operating the Gamma Spectroscopy System:

1. The protective plastic cap on the detector face is maintained in place when possible to protect the beryllium window and detector crystal.
2. Handle liquid nitrogen (LN) to fill detector dewar according to the steps described in this procedure.
3. Never exceed the voltage marked on the label on the detector crystal.
4. The full, or partially full, LN dewar should not be stored in small, enclosed areas. Off-gassing LN can displace oxygen in the atmosphere and make the space unsafe for human occupancy.

5. Cable connectors are easily damaged. Careful handling and storage of cables will prolong their usefulness.
6. When graphing results of daily QC checks on the QC chart (Attachment 1), take note of the space remaining on the chart. New charts should be made at least 1 week prior to completion of the chart in use.

3.2 Quality Control Checks

QC checks include the following:

- QC check source(s) specified on QC data form (Attachment 2)
- QC check source fixture, which holds check sources at a prescribed distance and position from the detector during QC counts
- QC check source with decay characteristics and activity sufficient to provide:
 - a. For QC checks, multi-gamma source(s) with a minimum of two distinct gamma energies, including:
 - One or more gamma energies between 10 and 500 kilovolts (keV)
 - One or more gamma energies between 500 and 1500 keV
 - b. For all sources, a gamma emission rate in each energy line of at least 200 gammas per second

3.3 Setup Instructions

Follow the setup instructions below:

3.3.1 Verify LN Fill in Dewar

The full 7.0-liter dewar has an approximate holding time of 5 days. If the dewar is dry and the germanium crystal warm, fill the dewar using the following steps, and allow the crystal to cool completely before high voltage (HV) is applied. The 7.0-liter dewar requires a minimum of 4 hours to cool. If the remaining LN in the dewar is likely to run dry before the end of use for the day, fill according to the following steps:

- a. Don the appropriate personal protective equipment (PPE) (gloves, safety glasses).
- b. Place the dewar in the horizontal position.
- c. Remove fill port vent cover, and connect the free end of the LN transfer line over either one of the fill port tubes.
- d. Open LN source fill valve and fill dewar until LN begins to run freely out of the open port tube.
- e. Close fill valve and disconnect transfer tube.

- f. Replace the vent cover.
- g. Record time and date of fill in the equipment operating form (Attachment 3).

3.3.2 Assemble Inspector System

- a. If AC power is not available, plug a battery into one or both the “A” and “B” battery connectors on the rear of the inspector.
- b. Connect system cables from detector to inspector in the following order:
 - 1. Connect the large rectangular connector to the inspector’s preamp connector.
 - 2. Connect the barrel-shaped Shield High Voltage (SHV) connector to inspector’s HV connector.
 - 3. Connect the rectangular connector to the detector preamp’s 9-pin power connector.
 - 4. Connect the cable's green INHIBIT connector to the detector preamp’s HV INHIBIT connector and the inspector’s HV INHIBIT connector.
 - 5. Place the protective sleeve over the green connector (optional).
 - 6. Connect the red energy connector to the detector preamp energy output connector and the inspector’s energy input plug.
 - 7. Connect the cable’s SHV connector to the detector preamp's SHV connector.

3.3.3 Power Up the System

- a. If batteries are used for power, and they have already been connected per 3.3.2.a, proceed directly to step 3.3.3.c.
- b. Connect inspector system components to AC power supply in the following order:
 - 1. Connect DC power adapter onto the “A” battery connector on the inspector.
 - 2. Connect battery DC power adapter into the Sony power adapter.
 - 3. Plug Sony power adapter into a 110-volt (V) AC power source.
 - 4. Plug computer AC power adapter into a 110-V AC power source.
 - 5. Plug computer AC power adapter into power receptacle on computer.
- c. Verify that the status light on the computer is illuminated.
 - 1. If status light fails to illuminate, check all connections and power supplies and recheck light.
 - 2. If status light remains unlit, contact supervisor for assistance.
- d. Power up inspector and computer in the following order:
 - 1. Press the inspector power switch *ON*.

2. Check the battery indicator lights on the front of the inspector and proceed accordingly:
 - (a) If battery indicator lights are *steady green* or *blinking green*, you have adequate power.
 - (b) If battery indicator lights are *blinking red* or *steady red*, battery charge is very low. Operator should power down system and recharge batteries before further use.
 - (c) If battery indicator lights are off, both batteries are completely discharged, or no battery is connected to this port, or the inspector power switch is **OFF**. Recharge and/or reconnect batteries, or press power switch **ON**.
3. Turn on computer and start the acquisition software.
4. Verify the green LED on the detector next to "COLD" is illuminated. If LED is not lit, verify the LN level in the dewar and perform one of the following:
 - (a) If the dewar is out of LN, fill according to step 3.3.1 and wait for detector to cool completely.
 - (b) If the dewar has adequate LN, check the equipment operating form (Attachment 3) to determine if the detector has had the minimum amount of time to cool. If the detector has had adequate time to cool, the detector may be broken or a cable connection may be loose. Verify that all connections are tight. If the problem persists, then contact the supervisor for assistance.
5. Under the *MCA* menu bar, select *Adjust*.
6. If inspector battery power is used, select *PwrMgr*. If AC power is used, proceed to step 3.3.3.e.
7. In *PwrMgr*, select either *Bat Save* or *Bat Full*.

Caution: NEVER SET THE DETECTOR HIGH VOLTAGE TO EXCEED THE MAGNITUDE OR POLARITY PRINTED ON THE SIDE OF THE DETECTOR!

- e. Select *HVPS* and verify that the voltage setting and polarity are correct for that particular detector, as specified on the side of the detector crystal. If the *HVPS* is set at any other voltage, adjust to the proper operating voltage before proceeding.
- f. Click the Status On button. The Wait indicator in the upper left hand corner of the window will be on for 1 to 2 minutes while the HV is applied.
- g. When the *Wait* indicator goes off, select *Exit* to close the *Adjust* window.

3.4 Operating Instructions

3.4.1 Perform System QC Check

Note: QC checks are normally performed once daily on days the equipment is used to obtain quality data. Quality data is data that is bracketed by successful QC checks on consecutive

days of system use. QC checks may also be conducted anytime the operator suspects that the system is not performing satisfactorily.

- a. Center QC check source 30 centimeters (cm) in front of detector, on center line of detector.
- b. Under the *MCA* menu bar, select *Acquire Setup*.
- c. In the *Time Preset* block, select *Live Time* and *Sec* and set the time to 300.
- d. Under the *Acquire* command, select *Start*.
- e. Under the *Edit* menu bar, select *Sample Info*.
- f. Enter all pertinent information to identify conditions of the count per guidance included in Attachment 5 of this procedure.
- g. When the QC count is complete, select the *Display* menu bar and select *ROIs*, then *Load...* Type in the ROI filename according to the detector chosen in step 3.3.3.d.3(c).
- h. Click cursor on the channel with the maximum counts for peaks 1 and 2. This channel represents the peak centroid. Record the centroid energy, net peak counts, and Full-width at Half-maximum (FWHM) for each peak in the QC data form (Attachment 2).
- i. Compare results from step 3.4.1.h to acceptance criteria in QC data form (Attachment 2).

Note: The calculations for the QC chart may be performed with an approved spreadsheet (HPGE_QC.CLS).

1. If peak centroid energy, net peak counts, and FWHM results are within acceptance ranges, graph value of net counts on the QC chart (Attachment 1). Place a "Y" in the Acceptable Column, initial, and proceed to step 3.4.1.j.
2. If centroid energy results do not meet acceptance criteria, allow equipment additional time to warm up and repeat steps 3.4.1.d through 3.4.1.i. If centroid energy results after several attempts do not meet acceptance criteria, contact supervisor.
3. If net count or FWHM results do not meet acceptance criteria, visually check operating parameters (source-to-detector geometry, use of correct source, etc.) and repeat steps 3.4.1.d through 3.4.1.i immediately. If results from second attempt do not meet acceptance criteria, place a DO NOT USE tag on the detector and contact supervision for further instructions.

Note: The Gamma Spectroscopy System may be used to acquire spectral data on days when the daily QC counts are failed. However, the associated data are not considered quality data. Under these circumstances, the operator indicates that the data are not quality data on the spectrum acquisition form (Attachment 4).

- j. Save the last QC spectral file.
 1. Under the *File* menu bar, select *Save As*.
 2. Type in the file name of the QC spectrum. QC spectra shall be recorded in the format MMDDYYQC.CNF.

3. Press **ENTER** on keyboard or select **OK**.
- k. Log QC activities in equipment operating form (Attachment 3).
- l. Record QC spectrum data in spectrum acquisition form (Attachment 4).

3.4.2 Perform Background Count

Note: A minimum of one background count accompanies each group of spectra collected on the same day at the same location. The operator may collect additional background spectra anytime he/she suspects that background conditions have changed.

- a. If the lead sleeve or lead bricks are available for shielding, configure around detector crystal.
- b. Ensure that potentially radioactive samples or areas are absent from the detector's field of view during the background count.
- c. Under the **MCA** menu bar, select **Acquire Setup**.
- d. In the **Time Preset** block, select **Live Time** and **Sec** and enter the desired time.
 1. Normally, the **Live Time** of background counts are set to the same duration as the anticipated sample count time.
 2. Occasionally, upon discretion of the operator, the background count time can be set different to the sample count time.
- e. Under the **Acquire** command, select **Start**.
- f. Under the **Edit** menu bar, select **Sample Info**.
- g. Enter all pertinent information to identify conditions of the count per the guidance provided in Attachment 5 of this procedure.
- h. Save spectral data.
 1. Under the **File** menu bar, select **Save As**.
 2. Type in file name. Save background spectrums in the format MMDDYYB#, where B indicates background and # is the next sequential number for the day.
 3. Press **ENTER** on the keyboard.
 4. Record background count information in spectrum acquisition form (Attachment 4).

Note: Unwanted signals are those at energies, which would interfere with the analysis to be performed. Example: A high background at 413.7 keV, when sample to be analyzed has expected peak at the same energy.

- i. Qualitatively review background spectrum to ensure that unwanted radiation signals are not present in the detector's field of view. If unwanted signals are present, take the appropriate steps to have them removed or minimized, or reposition the detector. Once unwanted signals have been eliminated, repeat steps 3.4.2.a through 3.4.2.h.

j. Select *Clear*.

k. Select *No*.

3.4.3 Perform Sample Count(s)

a. Before proceeding with sample counts, verify the following:

1. The QC check results are in the acceptable range.
2. A background spectrum was collected at the sample counting location within the last 24 hours.
3. There are no known or measured non-background radiation sources in the field of view of the detector that could confuse the spectral data from the sample (e.g., previously determined radioactive samples are moved from the detector field of view).

b. Position sample, item, or container in the detector's field of view.

c. Ensure that detector shielding configuration is identical to the conditions of the background count. If not, adjust appropriately before proceeding to the next step.

d. Acquire and save spectra in accordance with steps 3.4.2.c through 3.4.2.h, with the following exceptions:

1. Save sample spectra in the format MMDDYY##, where the number (##) is sequential on a daily basis and determined from the spectrum acquisition form (Attachment 4). The first spectra on each new day begins with number 01.
2. Write an item name or identifier on all items that do not have individual bar-code stickers or waste container labels present. This is a descriptive name the operator gives to items so they can be uniquely identified after the assay results are complete. This name should correspond to the entry made in the *SAMPLE ID* field during performance of step 3.4.2.g.
3. At times, it may be desirable to perform an investigative count to determine the optimal source to detector configuration. Short counts for this purpose do not need to be saved.
4. At times, it may be desirable to suspend a count in order to re-orient the source to detector configuration. The decision to perform this step is based upon the professional judgment of the operator.

e. To collect additional spectra, select *Clear*.

f. Select *No*.

g. Repeat steps a through f for each additional spectra.

3.5 Power Down and Disassembly Instructions

3.5.1 Power Down

a. Under the *MCA* menu bar, select *Adjust*.

b. Select *HVPS*, and click the *Status Off* button.

- c. The *Wait* indicator should be on. When the *Wait* indicator goes off, select *Exit* to close the *Adjust* window.
- d. Select *File, Exit* to close the Gamma Acquisition & Analysis Window.
- e. Select *Start*, then *Shut down*. At the question “**Shut down the computer,**” select *Yes*. The computer will automatically turn itself off.
- f. Turn the inspector power switch **OFF**.

3.5.2 Disconnect Cables

- a. Disconnect inspector from computer cables in the following order:
 1. Unplug the computer AC power adapter from the AC source.
 2. Unplug the DC power from the computer.
 3. Unplug the Sony power adapter from the AC source.
 4. Unplug the battery DC power adapter from the Sony power adapter.
 5. Disconnect the battery DC power adapter from the inspector.

Caution: To avoid harming the germanium crystal, the following instructions must be performed in the exact sequence.

- b. Disconnect inspector from detector cables in the following order:
 1. Disconnect the SHV connector from the detector.
 2. Disconnect the RED connector from the detector and the inspector.
 3. Disconnect the GREEN connector from the detector and the inspector.
 4. Disconnect the rectangular connector from the detector.
 5. Disconnect the SHV connector from the inspector.
 6. Disconnect the rectangular connector from the inspector.
- c. Remove batteries
 1. Unplug batteries from the inspector connectors and store properly, OR if necessary, recharge.

4.0 QUALITY RECORDS

Note: Forms referred to in this procedure are reproduced directly from the procedure for use.

4.1 Spectra Files

Copy spectra files from computer hard drive to removable media. Label and date all media.

4.2 Generated Records

The following records are generated in the performance of this procedure:

- QC chart (Attachment 1)
- QC data form (Attachment 2)
- Equipment operating form (Attachment 3)
- Spectrum acquisition form (Attachment 4)

4.3 Record Maintenance

Operating forms and charts are maintained with the equipment until completed and forwarded for filing in the central files as described below.

4.4 Spectrum Acquisition Forms

4.4.1 When an individual page in the spectrum acquisition form is full, start a new page.

4.4.2 Submit completed forms for filing.

4.5 Equipment Operating Forms

4.5.1 When equipment operating form is full, start a new page.

4.5.2 Submit completed forms for filing.

4.6 Quality Control Data Form

4.6.1 Generate new QC data form as indicated in the performance of this procedure.

4.6.2 Close out old QC data form by drawing one line across all remaining data lines and record the following data next to the line:

“Record closed out (date), due to recalibration of equipment.”

4.6.3 Attach old QC data form to old QC charts and QC data worksheet.

4.6.4 Submit completed forms for filing.

4.7 Quality Control Chart

4.7.1 Generate new QC chart as indicated in the performance of this procedure.

4.7.2 Close out old QC chart by drawing one line across all remaining data lines and record the following data next to the line:

“Record closed out (date), due to recalibration of equipment.”

4.7.3 Remove all but the latest QC charts and the new chart generated following equipment calibration.

4.7.4 Attach QC charts to old QC data form and QC data worksheet.

4.7.5 Submit completed forms for filing.

4.8 Quality Control Data Worksheet

4.8.1 Generate new worksheet as indicated in the performance of this procedure.

4.8.2 Attach old QC data worksheet to old QC data form and QC chart.

4.8.3 Submit completed forms for filing.

5.0 ATTACHMENTS

Attachment 1: Quality Control Chart

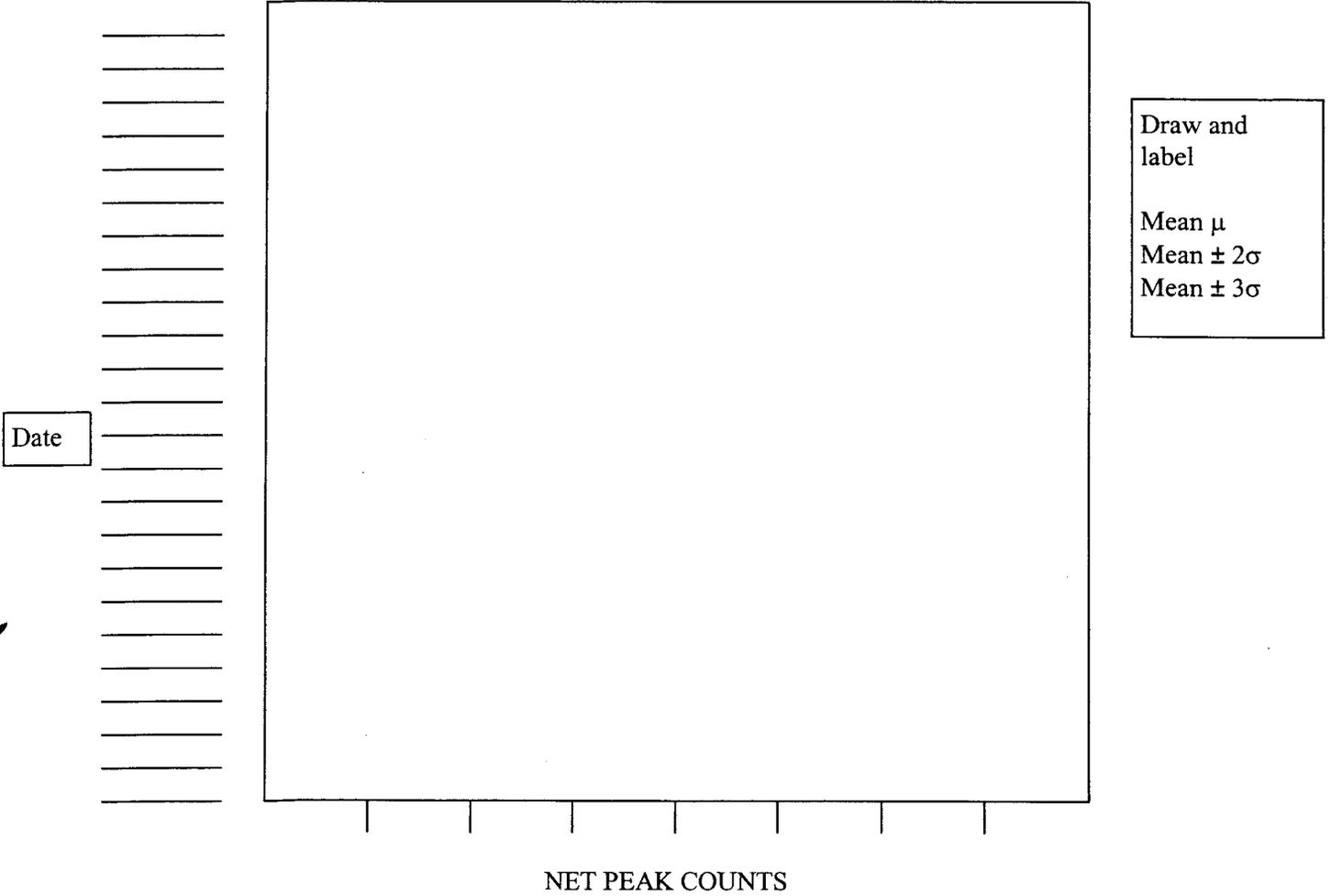
Attachment 2: Quality Control Data Form

Attachment 3: Equipment Operating Form

Attachment 4: Spectrum Acquisition Form

Attachment 5: Guidance for Determination of Sample Identification Data

ATTACHMENT 1
QUALITY CONTROL CHART



ATTACHMENT 5

GUIDANCE FOR DETERMINATION OF SAMPLE IDENTIFICATION DATA

The following provides guidance for entering information into the **Sample Info** menu for spectral files generated with the Gamma Spectroscopy System. Information should be entered similarly for QC, background, and sample counts, unless otherwise noted.

1. **SAMPLE TITLE:** Enter the filename for the spectra according to one of the following formats. The default for the system saves all files as **.cnf**.

QC counts: MMDDYYQC

Background counts: MMDDYYB#

Sample counts: MMDDYY##

2. **SAMPLE ID:** If an Eberline Services' item bar-code number or container label number has already been assigned, enter that information. Otherwise, enter the spectra filename (e.g., 09199703).
3. **COLLECTOR NAME:** Enter your name.
4. **TYPE:** Choose the appropriate container type from the pull down box. Designate all atypical container/items as "Other."
5. **QUANTITY:** Normally used to enter the weight of the sample, with the corresponding units (lbs or kg) entered in the **UNITS** field. (If information on the weight is determined to be unnecessary, the operator could enter other relevant technical information.) If count is background count, enter 1 in "QUANTITY."
6. **SAMPLE DESCRIPTION:** Enter a comprehensive description of information about the count that is not included in other fields. This includes, but is not limited to, the following:

Location: Enter the site name, building, and room (or area) where the count was conducted.

Item Description: Fully describe the physical characteristics of the item including dimensions, shape or volume, constituents, orientation to detector, and potential location of contamination in the item (if known).

7. **UNCERTAINTY:** This field is not used.
8. **UNITS:** Enter the units of weight, lbs or kg, corresponding with the entry in the **QUANTITY** field. If other technical information is entered in the **QUANTITY** field, enter the corresponding units here as appropriate. If count is background enter **BG**, or if a quality control count is performed enter **QC**.
9. **SAMPLE GEOMETRY:** Enter the distance from the front of the item to the face of the detector and the associated units (e.g., "@ 6 in.").
10. **RANDOM ERROR (percent):** This field is not used.
11. **SYSTEMATIC ERROR (%):** This field is not used.
12. **LOAD CAL:** This field is usually left alone.
13. **BUILDUP TYPE:** This field is not used. The default should indicate the **None** button is selected.
14. **SAMPLE DATE:** This field is not used.

APPENDIX D-2

**SOP 2, LASER-ASSISTED RANGING AND DATA SYSTEM (VEHICLE-
AND BACKPACK-BASED) PROCEDURES**

APPENDIX D-2
STANDARD OPERATING PROCEDURE (SOP) 2
LASER-ASSISTED RANGING AND DATA SYSTEM
(VEHICLE- AND BACKPACK-BASED) PROCEDURES

1.0 PURPOSE AND SCOPE

1. This procedure provides guidance for a qualified Radiological Control Technician (RCT) to operate the Laser-assisted Ranging and Data System (LARADS) and the associated auto-tracking total station to perform vehicle- or backpack-based radiological surveys.

2.0 EQUIPMENT/MATERIALS

1. LARADS equipment
2. LARADS calibrated Eberline E-600 ratemeter or other appropriate instrument
3. Supplemental equipment (for example, flashlight depending upon lighting and working conditions in the survey area)

3.0 PROCEDURE FOR USING LARADS

1. Identify the area to be surveyed, at least two “benchmark” points with known state plane coordinates must be identified near or within the survey area.
2. Prepare the auto-tracking total station for operation.
 - a. Erect the tripod at a height suitable for the operator and level so the tripod platen is perpendicular to the survey marker. The platen must be as level as possible and centered over the marker as closely as possible.
 - b. Gently place the LARADS total station on the tripod platen, aligning the triangular-shaped base platen of the total station with the triangular top of the tripod platen. Do not release the total station from your grip. Insert and tighten the tripod platen screw mount to the bottom platen of the total station. Hand-tighten only. Do not over-tighten. The total station may now be released.
 - c. Using the round bubble level on total station base, perform coarse leveling by adjusting the black thumb wheels on the total station tribrach.
 - d. Using the optical plummet on the total station, locate the total station directly over the marker as follows:
 1. Focus the optical plummet as needed by using the outer ring on the eyepiece.
 2. Center the total station by slightly loosening the tripod platen screw and, while grasping the total station tribrach, observe the survey marker. Gently slide the total station on the tripod platen (avoid horizontal rotation) to center the marker in the lens crosshairs. Re-tighten the tripod platen screw.
 3. Depress the total station free-release button and rotate the unit head until it is aligned with two of the black thumb wheels. Observe the fine bubble level located

above the keypad on the total station head. Adjust the aligned thumb wheels to fine-adjust the level of the unit in this orientation. When the unit is level in this orientation, press the free-release button and rotate the head 90 degrees to align the unit head over the opposite thumb wheel. Observe the bubble level in this orientation and adjust the single thumb wheel, as necessary.

4. Repeat the process described in Steps 2 and 3 until the unit is fine-leveled in both orientations and the unit is aligned with the survey marker.
 - e. Connect the power and data leads to total station connections.
 - f. Carefully measure the height from the survey marker to the scope axis mark on the side of the total station. Note the height, rounding to the nearest 100th. Record this as the "Instrument Height" in the LARADS log to two decimal places (for example, "4.53").
 - g. Connect the other end of the power lead to total station battery. The battery may be placed within the tripod legs but not over the survey marker.
 - h. Connect the other end of data lead to "COM1/SERIAL 1" port of the system computer.
 - i. Depress the power button to turn the total station ON. Observe the total station and confirm that the APL-1 completes a vertical angle tilt-over self check on power-up. Pressing the number "9" on the keypad will turn on the display's back light.
 - j. Using the sights on total station, adjust the horizontal and vertical control knobs on the side of the total station to aim the total station at the prism positioned on the floor, a second benchmark point (prism on a range pole), or against the wall. Optics may be focused with the large outer ring on the eyepiece of the sights.
3. Prepare system for survey.
 - a. From the mode submenu, select "SETUP ON INITIAL POINT" then press the "ENTER/RETURN" key.
 - b. Select the State Plane Coordinate option then press the "ENTER/RETURN" key.
 - c. Enter the instrument height then press the "ENTER/RETURN" key.
 - d. Enter in the values for the occupied point for N (Northing) then press the "ENTER/RETURN" key.
 - e. Enter values for E (Easting) then press the "ENTER/RETURN" key.

NOTE: Enter the entire Northing and Easting values (for example, 156537.336, 6576219.325 and so forth).

 - f. The total station and computer are now ready for surveying. Proceed to step 5.

4. Operating the LARADS

- a. To perform the survey, the steps listed below should be followed.

NOTE: Pressing "ESCAPE" at any time will pause the survey. Pressing "ESCAPE" a second time will act as a toggle to restart the survey.

1. Position the detector with the attached prism at the survey area start point.
2. Using the horizontal and vertical control knobs on the LARADS total station, point the laser at the prism. At the system computer display, select "MODE" (if not already selected) then press the "ENTER/RETURN" key.
3. From the mode submenu select "AREA SWEEP SURVEY" then press the "ENTER/RETURN" key.

NOTE: LARADS is now tracking detector and logging information.

5. Perform survey as per the survey plan and/or pre-job discussions.

- a. Begin the survey.
- b. When the survey is completed, press "ESCAPE." Press the "ENTER/RETURN" key at the "MODE" menu. From the mode submenu, select "END SESSION/PROCESS" then press the "ENTER/RETURN" key.

NOTE: Pressing "ESCAPE," "M," then "E" is a shortcut to this step.

4.0 ATTACHMENTS

None.

APPENDIX D-3

**SOP 3, PREPARATION OF PORTABLE RADIATION AND
CONTAMINATION SURVEY METERS AND INSTRUMENTS FOR
FIELD USE**

APPENDIX D-3
STANDARD OPERATING PROCEDURE (SOP) 3
PREPARATION OF PORTABLE RADIATION AND
CONTAMINATION SURVEY METERS AND
INSTRUMENTS FOR FIELD USE

1.0 PURPOSE

This procedure is used to specify the general requirements for preparing portable radiation and contamination survey meters and instruments for use at field locations. The procedures presented below will be supplemented by the specific instrument operation manuals, Tetra Tech EC, Inc. (TtEC)-approved subcontractor procedures, and specific work documents.

2.0 SCOPE

This procedure will be used by TtEC personnel and its subcontractors for preparation of portable radiation and contamination survey meters and instruments used on site. This procedure is intended to provide general instructions for preparing radiation and contamination survey meters and instruments for field operations. Development of specific procedures for the implementation of the requirements of this procedure is the responsibility of the end users.

In certain instances the requirements of this procedure may need to be added to or modified for specific field operations. Additional requirements and guidance for these cases will be provided in work-specific documents (i.e., Radiological Survey Work Plan, etc.), will be subject to the same review process as this document, and will have precedence over the guidelines in this document as appropriate.

3.0 DEFINITIONS AND ABBREVIATIONS

Acceptance Range – A range of values that describes an acceptable instrument check result. An acceptance range is typically determined by adding ± 20 percent or $\pm 2\sigma$ to the expected value.

Calibration Sticker – A label affixed to a properly calibrated instrument. The calibration sticker may be applied by the calibration facility or the end user. The calibration sticker should indicate the date through which the calibration is valid.

Chi-Square Test – A probability density function that gives the distribution of the sum of the squares of a number of independent random variables each with a normal distribution with zero mean and unit variance, that has the property that the sum of two or more random variables with such a distribution also has one, and that is widely used in testing statistical hypotheses especially about the theoretical and observed values of a quantity and about population variances and standard deviations. This test is used to evaluate the operation of an instrument, generally upon return from calibration.

Check Log – A form or series of forms which are used to document that an instrument was checked prior to usage in the field. Check logs can consist of multiple pages and must contain at least one page identifying the instrument. At least one page must also specify the parameters (source, geometry, etc.) used for the daily check. Space shall be provided to document the daily tests in the log. The log should be designed so as to clearly associate the required verifications with the signature or initials of the individual performing the check and date of each check.

Instrument Efficiency – A measure of the response (counts) obtained with a particular instrument when exposed to a known fluence of radioactive particles. Instrument efficiency has units of counts per particle.

4.0 PROCEDURE DETAILS

4.1 Calibration

Instrument calibrations shall be performed using measuring and test equipment and National Institute of Standards and Technology (NIST) traceable sources. Calibrations will be performed at an accredited calibration laboratory. Calibration will be performed in accordance with the equipment manufacturers' manuals or a subcontractor's TtEC-approved procedure. Properly calibrated instruments shall be marked with a calibration sticker and include an accompanying calibration certificate.

Calibration shall be performed annually (± 15 days) or on a schedule consistent with the manufacturer's recommendation if more restrictive. The routine frequency may be extended by up to one additional month with written approval of the Project Health Physicist (PHP), or designee. However, the frequency of calibration may not be extended when instruments are being used for surveys of record (i.e., Final Status Surveys, Characterization Surveys, etc.) In addition to the routine frequency of performance, calibration shall be performed under the following conditions:

- Prior to placing a new instrument into service.
- After any major repair or alteration to the instrument or detector.

4.2 General Considerations

Determination of instrument background, chi-square testing and instrument efficiency should be conducted in a controlled environment. This typically will consist of a secured office or lab area located in a non-impacted area and which is known to be free of contamination. Testing jigs or apparatus may be employed as necessary to ensure that consistent, reproducible geometries are used, particularly during repeated measurements.

Table 4-1 gives suggested geometries to use for the most common instrument types to be used at Alameda Point. Alternate geometries can be used provided that they are more appropriate for the intended usage of the instrument.

TABLE 4-1

SUGGESTED GEOMETRIES FOR BACKGROUND MEASUREMENTS AND SOURCE CHECKS

Measurement	Instrument/Detector Combinations	Probe Location
Exposure Rate	Eberline MicroREM Meter or equivalent with integral tissue equivalent plastic or sodium iodide (NaI) 1"x1" detector	contact ^a
Gamma	Eberline E-600 or equivalent with a Ludlum Model 44-10 or equivalent detector	4 inches above ground surface/source
Beta/Gamma	Ludlum Model 3 portable survey meter with Eberline SHP380AB probe or equivalent	¼ inch above ground surface/source
Alpha/Beta	Eberline E-600 or equivalent portable survey meter with Eberline SHP380AB or equivalent detector	¼ inch from surface/source

Notes:

^a Field readings with exposure rate instruments are conducted at 1 meter; background determination, chi-square test and operational checks are typically performed at a more convenient distance. Geometry should be documented as appropriate on the relevant data forms and logs.

4.3 Determination of Instrument Background

The determination of an instrument-specific background is an optional procedure which may be employed at discretion of the subcontractor. There is no regulatory requirement that necessitates the determination of background for each instrument. Instrument background determination is typically performed in a controlled environment and usually consists of a series of repeated background measurements that are statistically analyzed to obtain an expected range of valid background values. The established instrument background range can be used as a means of performing daily operation checks.

Instrument background determinations, when necessary, are considered valid for as long as the instrument has been properly maintained per the requirements of this procedure. If instrument backgrounds are required, a new background determination should be performed following each calibration.

When determining instrument background, the appropriate approved subcontractor's procedures shall be followed; however, any specific instructions for background determination in governing work-specific documents shall have precedence.

When required, background determinations will be documented on an approved subcontractor form or as specified in the work-specific procedures. The form should include the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for determination (geometry, radiation type, operating voltage, etc.)
- Date and time of determination
- Identification and signature or initials of technician
- Identification and signature of reviewer

The end result of a background determination should be to obtain an acceptance range for subsequent background checks.

4.4 Chi-Square Test

When chi-square tests are required by work-specific documents, the appropriate approved subcontractor's procedures shall be followed; however, any specific instructions for chi-square testing in governing work specific documents shall have precedence. When required, chi-square tests shall be performed annually (± 15 days), following calibration, or if there is reason to suspect that the instrument calibration may no longer be valid (i.e., inability to obtain a valid range of chi-square values).

Chi-square tests shall be performed with NIST traceable sources with isotopic content appropriate to the detector being evaluated and the anticipated contaminants in the survey area. The source should be of sufficient activity to yield a counting rate of 1,000 to 50,000 counts per minute (cpm). The source should not exceed 50,000 cpm.

When required, chi-square tests should be documented on an approved subcontractor form or as specified in the work-specific documents. The form should include the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for the test (geometry, radiation type, operating voltage, etc.)
- Source ID number

- Date and time of determination
- Identification and signature or initials of technician
- Identification and signature of reviewer

The chi-square test procedure will produce a chi-squared value (χ^2), which should be between 10.11 and 30.14. Failure to obtain a chi-squared value in this range indicates a problem with either the instrument or the methodology used to perform the chi-square test and requires further investigation. The PHP should be notified of the failure to assist in planning a course of action.

4.5 Instrument Efficiency for Portable Instruments

The instrument efficiency (ϵ_i) is the ratio between the net count rate (in cpm) of the instrument and the surface emission rate of the efficiency check source for a specified geometry. The surface emission rate is the 2π particle fluence that is affected by both the attenuation and backscatter of the radiation emitted from the efficiency check source.

The following equation is used to calculate the instrument efficiency in counts per particle:

$$\epsilon_i = \frac{R_{S+B} - R_B}{q_{2\pi} \left(\frac{W_A}{S_A} \right)}$$

Where,

- R_{S+B} = the gross count rate of the efficiency check source, measured in cpm
- R_B = the background count rate in cpm
- $q_{2\pi}$ = the 2π surface emission rate of the calibration source (NIST traceable)
- W_A = the active area of the probe window in square centimeters (cm^2)
- S_A = the area of the source in cm^2

Note: This equation assumes that the dimensions of the efficiency check source are sufficient to cover the window of the instrument detector. If the dimensions of the efficiency check source are smaller than the detector's window, set W_A equal to the dimensions of the efficiency source (i.e., set the quotient of W_A and S_A equal to 1).

Instrument efficiency shall be determined for all instruments and radiation and contamination survey meters that are to be used for alpha and beta surveys prior to use for field operations. Instrument efficiency is dependent upon energy of the incident radiation. Multiple energy-specific instrument efficiencies may be determined when isotopes with significantly varying energies are analyzed.

The procedures in the approved subcontractor's procedures shall be followed to determine the instrument efficiency for those instruments for which it is required. In instances where governing work-specific documents specify a means or expanded scope of inclusion for instrument efficiency determination, they shall have precedence.

All instrument efficiency determinations should be documented on an approved subcontractor form or as specified in the work-specific documents. The form should include the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector

- Conditions used for determination (geometry, radiation type, operating voltage, etc.)
- Source-specific information (ID number, surface emission rate, area)
- Detector window area
- Date and time of determination
- Identification and signature or initials of technician
- Identification and signature of reviewer (typically the PHP)

The resulting instrument efficiency should be reported in units of counts per particle.

4.6 Operation Check

An operation check for each instrument should be performed at the beginning of each workday that a particular instrument is used. The operations check should include the following checks at a minimum:

- Check that instrument calibration is still valid (date on sticker not yet passed)
- Check the instrument (including the probe) for physical defects (knobs, displays, cables, connectors, Mylar windows, etc.)
- Check of instrument battery (per manufacturers' instructions)
- Source check (should give consistently reproducible results with same source)

Failure of any of the above checks shall result in the instrument being removed from active service until the condition can be addressed. The PHP should be notified of any instrument failing an operations check for reasons other than failure of a battery check. In cases of battery check failure, the battery should be replaced and the check repeated.

The specified checks should each be performed every day and documented on a new line of the check log. A separate check log shall be maintained for each instrument. The check log shall contain the following information at a minimum:

- Identification information (i.e., model and serial numbers) for the instrument and detector
- Conditions used for the check (geometry, radiation type, etc.)
- Source ID number
- Verification of current calibration
- Verification of physical condition
- Verification of battery check
- Verification that source check is in acceptance range
- Date of operational check
- Signature or initials of technician
- Identification and signature of reviewer

Of the required information given above, only the verifications, date and signature or initials need to be completed on a daily basis. The remaining information can be completed once and kept in the check log

with the additional pages for daily checks, provided that none of the information changes. If the information changes, then a new check log should be started.

4.7 Maintenance

Instruments shall be stored in areas, which prevent damage by movement, accumulation of moisture or dust. Detector covers shall be used for storage when practical.

Instrument maintenance (except external adjustments and cable or Mylar window replacements) shall be performed by the manufacturer or an approved vendor.

5.0 RECORDS

Records that result from this procedure may include forms that document background determinations, chi-square tests, instrument efficiency and check logs. Record forms shall be obtained from approved subcontractor procedures or specified in work-specific procedures.

6.0 REFERENCES

<i>Number</i>	<i>Title</i>
None	

7.0 ATTACHMENTS

None.

APPENDIX D-4

SOP 4, SAMPLING PROCEDURES FOR RADIOLOGICAL SURVEYS

APPENDIX D-4
STANDARD OPERATING PROCEDURE (SOP) 4
SAMPLING PROCEDURES
FOR RADIOLOGICAL SURVEYS

1.0 PURPOSE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to perform swipe sampling and sampling of various types of media including soil, sediment, solid material (such as concrete, brick, porcelain, wood), and water. This procedure also details sample packaging and transporting samples to the laboratory.

2.0 SCOPE

This procedure shall be implemented by TtEC staff and subcontractor personnel when collecting samples on field projects related to radiological surveys.

3.0 DEFINITIONS AND ABBREVIATIONS

Swipe Samples – Swipe samples are materials, which after being wiped over a surface, are analyzed to determine the presence of removable radioactivity on the surface area that was wiped.

Soil Samples – Soil samples are defined as soil collected for analytical purposes. Soil samples will be collected from the top 20 inches of the surface.

Sediment Samples – Sediment samples are defined as a collection of clay, silt, sand, and/or gravel deposited by water, wind, or glaciers used for analytical purposes.

Solid Material Samples – Solid material samples are defined as pieces of concrete, brick, porcelain, wood, or any other hard material collected for analytical purposes from buildings or surrounding areas. The samples could include accumulations from ventilation systems or drain systems.

Liquid Samples – Liquid samples are defined as liquid collected for analytical purposes from rinsate and liquid investigation-derived waste.

4.0 SAMPLING PROCEDURE DETAILS

4.1 General Procedures

Field instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibration.

Anytime this procedure is in effect, the Project Health Physicist (PHP) (or qualified designee) should ensure, by periodic personal observation, that samples are appropriately collected and controlled.

Surface scan surveys are to be performed at each location before initiating sampling. This will identify the presence of gross contamination, which will require that samples and equipment be treated as radioactive and handled in accordance with applicable license requirements. Samples will be recorded on chain-of-custody (COC) documentation.

4.2 SAMPLING Procedure Process

Sample activities will be recorded in the field logbook as directed by the applicable Sampling and Analysis Plan (SAP). Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples at each location.

4.2.1 Swipe Sampling

Swipe samples will be obtained in accordance with Appendix D-6, Radiation and Contamination Surveys. Swipe samples will be documented in the sample logbook as applicable. Sample COC records shall be completed in accordance with the SAP.

4.2.2 Soil Sampling

The sampling protocol described here is based on obtaining a sample of the upper 20 inches of soil. Samples will be collected with a hand-auger, disposable scoop, or equivalent. The soil removed for sampling must be sufficient to yield a sample of sufficient volume for the sample container being used. Soil samples will be collected and handled as follows:

1. Loosen the soil at the selected sampling location to a depth of approximately 20 inches, using a trowel or other digging instrument.
2. Remove large rocks, vegetation and foreign objects. In some cases, however, these objects may be the source of the contamination and may be collected as separate samples for characterization.
3. Place as much soil as practical into a 250-milliliter (mL) wide-mouth plastic bottle or plastic 500-mL Marinelli container.
4. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
5. Tape the cap of the container in place or seal the ziplock plastic bag.
6. Label the sample container in accordance with the SAP.
7. Document all samples collected in the sample logbook as applicable. Sample COC records shall be completed in accordance with the SAP.
8. Transport samples to the on-site laboratory for analysis as soon as possible after sample collection. Sample packaging and shipment procedures for transporting samples to an off-site laboratory are described in Section 4.3 of this procedure.
9. Clean or decontaminated tools will be used at each sampling location. Sampling tools will be decontaminated as described in the SAP.

4.2.3 Sediment Sampling

Several methods are available to collect sediment samples. The tools used will be appropriate to the circumstances and may include use of trowels, augers, or other hand tools. Sediment sampling will be conducted as follows:

1. A hand-auger, trowel or similar device will be used to access each sampling location. The sample collection tool will be selected based on physical limitations accessing the sample location.
2. Place as much material as practical into a 250-mL wide-mouth plastic bottle or plastic 500-mL Marinelli container.
3. Follow steps 4 through 9 of Section 4.2.2 to complete sample collection.

4.3 Sample Packaging and Transport

Samples will be delivered for analysis to an on-site laboratory via a box, cooler, or similar container (ice is not required if only radiological analysis will be performed) along with the completed COC. Upon arrival at the on-site laboratory, the sampler will sign the "Relinquished By" on the COC, and the laboratory manager will sign the "Received By" on the COC. The white copy of the COC will be submitted with the final analytical report of data from the on-site laboratory to the TtEC project chemist, the pink and yellow copies will be maintained by the on-site laboratory for their project files, and the manila copy will be submitted to the TtEC Project Chemist. A duplicate of the manila copy may also be kept in the TtEC project file on site.

Ten percent of the solid or liquid samples analyzed by the on-site laboratory will be sent to an off-site laboratory for quality assurance purposes. Additional samples may be sent for off-site analysis, as described in the Radiological Survey Work Plan. A new COC will be generated by the laboratory manager for samples designated for off-site laboratory analysis. Samples designated for transport off site will be packaged in accordance with applicable Department of Transportation (DOT) and International Air Transport Association (IATA) procedures. At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage.

For samples transported by an off-site laboratory courier, two custody seals will be taped across the lid of the box or cooler: one seal in the front and one seal in the back. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the top two copies (white and pink) of the COC will then be released to the courier for transportation to the laboratory.

For samples shipped via a commercial carrier, the COC will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies (white and pink) of the COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. The yellow copy of the COC will be maintained by the on-site laboratory and the manila copy will be submitted to the TtEC project chemist. A duplicate of the manila copy may also be kept in the TtEC project file on site. The box/cooler will be taped shut with strapping tape as necessary. Two custody seals will be taped across the lid: one seal in the front and one seal in the back. The pouch for the airbill will be placed on the box/cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple boxes/coolers are being shipped, then the original airbill will be placed on the box/cooler with the COC, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated in advance with the designated off-site laboratory and placement of "Saturday Delivery" stickers on each box and/or cooler to be shipped should be confirmed with the commercial courier prior to release. Prepared packages will also be surveyed prior to shipment.

5.0 RECORDS

Sample collection records will include field logbooks and COCs. These records will be completed and maintained in accordance with the SAP.

6.0 REFERENCES

<i>Number</i>	<i>Title</i>
Appendix D-6, SOP 6	<i>Radiation and Contamination Surveys</i>

7.0 ATTACHMENTS

None.

APPENDIX D-5

**SOP 5, RELEASE OF MATERIALS AND EQUIPMENT FROM
RADIOLOGICALLY CONTROLLED AREAS**

APPENDIX D-5
STANDARD OPERATING PROCEDURE (SOP) 5
RELEASE OF MATERIALS AND EQUIPMENT
FROM RADIOLOGICALLY CONTROLLED AREAS

1.0 PURPOSE

The purpose of this procedure is to specify the radiological survey requirements for releasing materials and equipment from radiologically controlled areas (RCAs).

2.0 SCOPE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors to release materials from RCAs.

3.0 DEFINITIONS AND ABBREVIATIONS

Contamination – Radioactive material in any place it is not desired. Contamination may be due to the presence of alpha particle, beta particle or gamma-ray-emitting radionuclides.

Fixed Surface Contamination – Contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe or masslin.

Radiologically Controlled Area (RCA) – An area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.

Release for Unrestricted Use – The authorization to remove or reuse equipment and/or material from a RCA. Such authorization will be based on review of survey data confirming that the material and/or equipment being released does not exhibit radiation levels exceeding those in Table 4-1.

Removable Surface Contamination – Contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe or masslin.

4.0 PROCEDURE DETAILS

4.1 General

Surveys for fixed and removable surface contamination shall be conducted and documented in accordance with Appendix D-6, Radiation and Contamination Surveys.

Items presented for release shall be surveyed in an area of relatively low background.

4.2 Limitations

This procedure shall not be used for personnel surveys. Personnel will be surveyed in accordance with Appendix D-7, Radiological Protective Clothing Selection, Monitoring, and Decontamination.

4.3 Release Procedure

4.3.1 Material History

Upon receipt of an item presented for release from RCAs, the history of the item should be determined. This determination should include if possible:

- The current and past use of the item.
- The location(s) in which the item was used or stored.
- If the item was in an area where radioactive material was used or stored.

This history will be used, if applicable, to evaluate the potential for contamination to be present on inaccessible surfaces of the item.

4.3.2 Contamination Surveys

All accessible surfaces will be surveyed for removable and fixed surface contamination in accordance with Appendix D-6, Radiation and Contamination Surveys.

Swipes collected for removable surface contamination shall be analyzed with low-background gas-proportional counters. Typically a Protean IPC 9025 and/or a Tennelec Series 5 XLB gas-flow-proportional alpha/beta radiation counter will be employed to count swipes for the release of materials and equipment. As a backup to the gas-flow-proportional counters, an Eberline HandeCount portable alpha/beta counter (or equivalent) may be used.

Following the scan survey, the number of static survey measurements to be collected shall be determined by:

- Size and history of the item.
- Preliminary results of the swipe and scan surveys.
- If an increase in the audible and/or digital/analog count rate was detected.
- If during the survey, the Radiological Control Technician determines that there may be fixed activity present.

4.3.3 Inaccessible Surfaces

Items with inaccessible surfaces, that may have been exposed to contamination or it is unknown if they have been exposed to contamination, should be disassembled as completely as possible to facilitate release surveys. Items with inaccessible surfaces will not be released from an RCA, unless evaluated and documented by the Project Health Physicist or designee in conjunction with the Radiological Affairs Support Office.

4.3.4 Release of Material and Equipment

The following steps shall be taken for release of material and equipment:

1. If the results of the swipe, scan and static surveys do not exceed the limits of Table 4-1, then the material may be released for unrestricted use.
2. If the swipe, scan or static survey results indicate contamination, which exceeds the limits of Table 4-1, the material shall not be released for unrestricted use. Material and equipment that

cannot be released for unrestricted use will be evaluated for decontamination in accordance with Appendix D-8, Decontamination of Equipment and Tools, or packaged for disposal.

3. Results of the swipe, scan and static surveys shall be documented in accordance with Appendix D-6, Radiation and Contamination Surveys.
4. If the equipment and/or materials are being returned to a vendor or removed from Alameda Point, a completed Attachment 1 – Unconditional Release of Equipment or Materials Form – will accompany the equipment and/or material.

**TABLE 4-1
RELEASE LIMITS FOR MATERIALS AND EQUIPMENT**

Radiation Type	Release Limits ¹ (Fixed) (dpm per 100 cm ²)	Release Limits ¹ (Removable) (dpm per 100 cm ²)
Alpha (α)	100	20
Beta (β-)	1000	200
Gamma (γ)	5,000	1,000

Notes:

¹ These limits are based on AEC Regulatory Guide 1.86 (AEC, 1974)

AEC – Atomic Energy Commission

cm² – square centimeters

dpm – disintegrations per minute

5.0 REFERENCES

<i>Number</i>	<i>Title</i>
AEC Regulatory Guide 1.86	<i>Termination of Operating Licenses for Nuclear Reactors</i>
Appendix D-6, SOP 6	<i>Radiation and Contamination Surveys</i>
Appendix D-7, SOP 7	<i>Radiological Protective Clothing Selection, Monitoring, and Decontamination</i>
Appendix D-8, SOP 8	<i>Decontamination of Equipment and Tools</i>

6.0 ATTACHMENTS

Attachment 1 – Unconditional Release of Equipment or Materials Form

ATTACHMENT 1

UNCONDITIONAL RELEASE OF EQUIPMENT OR MATERIALS FORM

Survey #:		Date:		
Description of equipment or materials:				
SURVEY EQUIPMENT:				
Model No:	S/N:	Background:	Eff:	Cal Due Date:
Model No:	S/N:	Background:	Eff:	Cal Due Date:
Model No:	S/N:	Background:	Eff:	Cal Due Date:
CONTAMINATION LEVELS:				
	dpm/100 cm ² βγ Removable			
	dpm/100 cm ² α Removable			
	dpm/100 cm βγ Fixed			
	dpm/100 cm ² α Fixed			
<p>This is to certify that the above described equipment or materials have been surveyed and found to be within acceptable surface contamination levels for unconditional release as required by AEC Regulatory Guide 1.86.</p>				
Radiological Control Technician:				Date/Time:
Disposition of equipment or materials:				
Reviewed By:				Date:

APPENDIX D-6

SOP 6, RADIATION AND CONTAMINATION SURVEYS

APPENDIX D-6

STANDARD OPERATING PROCEDURE (SOP) 6

RADIATION AND CONTAMINATION SURVEYS

1.0 PURPOSE

The purpose of this procedure is to specify methods and requirements for radiological surveys and documentation of acquired data.

Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results. This guidance for control of radiation exposures provided in this procedure is in accordance with the as low as reasonably achievable (ALARA) philosophy.

2.0 SCOPE

This procedure shall be implemented by Tetra Tech EC, Inc. (TtEC) staff and subcontractor personnel when conducting radiation or contamination surveys.

3.0 DEFINITIONS AND ABBREVIATIONS

Activity – The rate of disintegration (transformation) or decay of radioactive material. The units of activity for the purpose of this procedure are disintegrations per minute (dpm) for loose and fixed surface contamination, picocuries per gram (pCi/g) for soil, or microcuries per milliliter (μ Ci/mL) for airborne contamination.

Contamination – Deposition of radioactive material in any place is not desired. Contamination may be due to the presence of alpha particle, beta particle or gamma-ray-emitting radionuclides.

Controlled Area – Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.

Exposure Rate – The amount of radiation (exposure) delivered at a given point per unit time. Typical units are microroentgen per hour (μ R/hr).

Fixed Contamination – Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe, or masslin.

Minimum Detectable Activity (MDA) – For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95 percent confidence level based upon the background count rate of the laboratory counting instrument used.

Minimum Detectable Concentration (MDC) – For purposes of this procedure, MDC is the *a priori* activity level that a specific instrument and technique can be expected to detect 95 percent of the time for portable survey instruments.

Removable Surface Contamination – Radioactive contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe, or masslin.

Uncontrolled Area – An uncontrolled area is any area where access is not controlled for radiological purposes.

4.0 PROCEDURE DETAILS

4.1 General

Radiation surveys are performed to identify radiation areas, measure the exposure rate, and assess the intensity and shape of those areas to determine control requirements at the worksite.

Contamination surveys are conducted to detect loose surface contamination and fixed contamination. Loose surface contamination is normally detected indirectly by a swipe sample or wipe performed on the item or surface of interest. Fixed contamination levels are measured directly.

Survey results, locations, and any unusual conditions shall be documented and described on Attachments 1 and 2, Radiation/Contamination Survey Form and Radiation/Contamination Survey Supplement, respectively.

When performing surveys, express readings as the actual observed number. Do not report “<MDA” or “<Bkg”. When background corrections are made, results may be expressed as negative numbers as applicable.

4.1.1 Discussion

Radiation and contamination surveys shall be performed on an as-needed basis. The need for performing a survey is identified by, but not limited to the following conditions:

- A condition exists where radiological data are needed.
- An investigation is required due to abnormal conditions or indications.
- An ongoing job requires a survey to update radiological postings.
- As required to support *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM; NUREG-1575) based survey activities.

4.1.2 Planning and Prerequisites

Instruments used to perform radiation and contamination surveys shall be operated in accordance with their operation procedure. Steps to be completed during the planning phase include the following:

- Obtain appropriate survey instruments and prepare the instruments for use.
- Obtain the necessary forms, swipes, and applicable protective clothing that will be used during the survey.

Prior to entering an area to perform a survey, each radiation detection instrument shall be:

- Battery checked.
- Checked for obvious physical damage.
- Quantitatively response-checked daily, prior to use.
- Checked to ensure that the instrument calibration is current.

If any of the above conditions are unsatisfactory, the instrument shall be tagged out of service and not used.

4.2 Procedure Process

4.2.1 Exposure Surveys

Always survey a sufficient number of locations to determine average and maximum general area and contact radiation levels.

A Ludlum Model-19 or equivalent should be used for performing exposure rate surveys for gamma radiation. The instrument should be operated in accordance with the manufacturer-supplied operations manual and any applicable requirements from work-specific documents. Care should be taken to ensure that the instrument has been allowed to stabilize between individual measurements.

When performing general area exposure rate surveys, the Radiological Control Technician (RCT) should:

- Attempt to determine the source of radiation fields.
- Record the highest level as the general area exposure rate.
- Perform contact exposure rate measurements with the detector within 1 inch of the surface to be surveyed.
- Perform surveys at approximately 1 meter (waist level) from surface to establish posting requirements for the area.
- Verify the exposure rates of known hot spots.

4.2.2 Removable Contamination Surveys

4.2.2.1 Removable Contamination Swipe

The following guidance shall be used unless an approved site-specific survey/work instruction directs otherwise.

4.2.2.2 Swipe Surveys

1. Label or number swipes, as necessary, to identify each swipe.
2. Wipe the swipes over approximately 100 square centimeters (cm²) (16 square inches) of the surface to be sampled.
3. Apply moderate pressure.
4. Exercise care on rough surfaces so as not to tear the swipes.
5. Exercise care on wet surfaces so as not to degrade the swipes. Ensure that surfaces are not submerged in water and that cloth swipes or similar are used on wet/damp surfaces.

When surveying an area:

1. Obtain swipes from sample points, which are representative of the average and maximum contamination levels in the area, as identified during preliminary surveys. These areas could include:
 - a. Areas of high traffic
 - b. On and under benches or tables
 - c. Beneath piping and components
 - d. On accessible wall surfaces

- e. On piping and significant components
 - f. Near drains, sumps and low spots
2. Swipe floor and component surfaces, which display evidence of (potentially) contaminated water leakage.
 3. Ensure that contamination is not spread to clean areas when obtaining swipes.

When surveying equipment:

1. Obtain swipes on large surfaces.
2. Obtain swipes in cracks or crevices where contamination may have settled.
3. Obtain swipes on openings to internal surfaces.
4. Handle swipes in a manner that will prevent cross-contamination such as by placing each swipe in a separate envelope.

4.2.2.3 Counting Swipes

Low-background gas-proportional counters should be used whenever practical. Typically a Protean IPC 9025 and/or a Tennelec Series 5 XLB gas-flow-proportional alpha/beta radiation counter will be employed to count swipes. As a backup to the gas-flow-proportional counters a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent) may be used.

1. Count the swipes in accordance with the operating procedure for the instrument.
2. Record swipe results in dpm/100 cm².
3. Store/archive used swipes as radioactive material until disposal is approved by the Radiological Affairs Support Office (RASO).

4.2.2.4 Removable Contamination Surveys Using Large-area Wipes (LAWs)

Large-area contamination surveys using LAWs are appropriate for monitoring the radiological cleanliness of non-contaminated areas or equipment, to track area decontamination progress, or for initially verifying that surfaces are free from contamination.

There are no specific requirements concerning the amount of area to be wiped when performing LAWs. The area wiped should be determined based on the use of the survey data and the dust loading of the LAW material.

4.2.2.5 Performing LAWs

Use masslin, oil-impregnated cloths, or equivalent media to perform LAWs. Select an appropriate collection material and method based upon the survey conditions such as wet surfaces, rough surfaces, heavily soiled area and oily and greasy surfaces.

1. Label or number the cloths, as necessary, to assist in determining the location of the sample.
2. Determine the size of the area to be sampled based on the results of the survey.
3. Wipe the collection media over the surface using moderate pressure by hand, with a masslin mop, or other approved techniques.

4.2.2.6 Evaluating LAWs

1. Allow wet swipe to dry prior to counting.
2. Scan the swipe with an appropriate field instrument (2360/43-89, or equivalent), in an area with a low background.
3. Hold the detector within ½ inch of the swipe and move the detector over the swipe at a maximum rate of 1 inch per second.
4. If any indication of an increased count rate is noted, pause to allow the meter reading to stabilize.
5. If the swipe reading is indistinguishable from background, consider the surveyed surface to be free from contamination. If the LAW reading is greater, conduct further surveys to isolate the boundaries of the contamination.
6. Dispose of used LAW media as radioactive waste.

4.2.3 Surveys for Fixed Alpha/Beta Contamination

Fixed contamination surveys are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys. Fixed contamination surveys are also performed to assess if residual contamination is present greater than the release criteria for the radionuclide(s) of concern.

A Ludlum Model-2360/43-68 or equivalent should be used for performing fixed contamination surveys for alpha and beta radiation.

4.2.3.1 Scans

1. When surveying for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less from the surface being surveyed. The movement rate of the detector probe should be 1 inch per second or slower.
2. When performing direct scan surveys of objects, surfaces, materials, equipment, etc., static measurements should be performed frequently to ensure the detection of residual activity.
3. Whenever practical, 100 percent of accessible areas being surveyed should be direct-scan surveyed, unless the applicable work planning document indicates otherwise.
4. Scan ranges are documented as the range from the lowest measurement to the highest measurement observed.

4.2.3.2 Static

1. Count time for conducting static measurements will be dependent upon the isotope of concern and the MDA for the instrument being used.
2. Static measurements should be performed as required by a work-specific document or frequently enough to ensure the detection of residual activity.
3. When taking a static measurement for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less from the surface being surveyed.
4. Results should be reported in units of net counts per minute (cpm) above background or dpm/100 cm².

The following formula should be used for converting direct probe readings in cpm to dpm/100 cm²:

$$A_S = \frac{R_{S+B} - R_B}{\varepsilon_i \varepsilon_s \frac{W_A}{100 \text{ cm}^2}}$$

where,

- A_S = total surface activity (dpm/100 cm²)
- R_{S+B} = the gross count rate of the measurement in cpm
- R_B = the background count rate in cpm
- ε_i = the instrument efficiency (counts per particle)
- ε_s = the contaminated surface efficiency (particles per disintegration)
- W_A = the physical area of the detector window (cm²)

In the absence of experimentally determined surface efficiencies, ISO-7503-1 and NUREG-1507, provide conservative recommendations for surface efficiencies. ISO-7503-1, recommends a surface efficiency of 0.25 for alpha emitters. NUREG-1507 provides surface efficiencies based on studies performed primarily at Oak Ridge Institute for Science and Education. A surface efficiency of 0.25 will be used for alpha/beta emitters.

4.2.4 Gamma Surveys

A Ludlum Model-2350-1/44-10 or equivalent should be used for gamma radiation surveys.

A single detector or an array of detectors may be used to perform gamma scans.

4.2.4.1 Scans

1. Set the audio response switch to the "on" position.
2. If a single detector is used, traverse a path at a maximum speed of approximately 0.5 meters per second and slowly move the detector assembly in a serpentine (S-shaped) pattern, while maintaining the detector approximately 10 centimeters (cm) (4 inches) from the area being surveyed.
3. If a detector array is used, it will be pushed or pulled in a straight line with the detector centers positioned approximately 30 cm apart.
4. Scan ranges should be recorded from the lowest reading to the highest reading noted.
5. If data logging is being performed, the scan data will be collected at the time interval necessary to obtain the measurements required for the survey.
6. Locations of radiation levels greater than 3 standard deviations above background shall be marked and identified for further investigations.
7. Measurement results are recorded in cpm.

4.2.4.2 Static

1. Static photon measurements require positioning the detector assembly approximately 10 cm (4 inches) above the surface and completing a stationary 60-second survey.

2. Static measurements should be performed as required in the applicable work planning document or frequently enough to ensure the detection of residual activity.
3. Record results in cpm.

5.0 RECORDS

Radiation/Contamination Survey Form

Radiation/Contamination Survey Supplement

Survey Log

6.0 REFERENCES

<i>Number</i>	<i>Title</i>
ISO-7503-1	<i>Evaluation of Surface Contamination</i>
NUREG-1507	<i>Minimum Detectable Concentration/Activities for Typical Radiation Survey Instruments for Various Contaminants and Field Conditions</i>
NUREG-1575	<i>Multi-Agency Radiation Survey and Site Investigation Manual</i>

7.0 ATTACHMENTS

Forms provided in this section illustrate the minimum requirements for their respective subject matter. Alternative documents or electronic data logging may be used providing the information is presented in a clear and concise manner and the content meets or exceeds the information required to complete these documents.

Attachment 1, Radiation/Contamination Survey Form

Attachment 2, Radiation/Contamination Survey Supplement

Attachment 3, Survey Log

ATTACHMENT 1 – RADIATION/CONTAMINATION SURVEY FORM

DATE:	TIME:	INSTRUMENTATION USED				
SURVEY NUMBER:	Model Inst/Det.	Serial Number	Calibration Due Date	% Efficiency	MDC/MDA (dpm/100cm ²)	Background (dpm/100cm ²)
LOCATION:						
SURVEYOR:						
REVIEWED BY:						
RSO/RTM:						
Isotopes of Concern:						
Description or drawing:						
Routine (Daily / Weekly / Monthly) <input type="checkbox"/> Non-routine <input type="checkbox"/>					All radiation readings in $\mu\text{r/hr}$ unless otherwise noted. ⊕denotes swipe location or fixed α/β readings. #denotes G/A radiation readings. #/#denotes contact / 1 meter radiation readings. *denotes highest radiation reading on contact. Δdenotes static location.	

ATTACHMENT 2 - RADIATION/CONTAMINATION SURVEY SUPPLEMENT

SURVEY NUMBER:								
SURVEYOR:				LOCATION:				
Location	Exposure Rate (μ R/hr)		Fixed + Removable			Removable		Comments
	Contact	1 Meter	Gamma (cpm)	Alpha dpm/probe	Beta/Gamma dpm/probe	Alpha dpm/100cm ²	Beta/Gamma dpm/100cm ²	
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
Reviewer			Date/Time:		PHP		Date/Time:	

APPENDIX D-7

**SOP 7, RADIOLOGICAL PROTECTIVE CLOTHING SELECTION,
MONITORING, AND DECONTAMINATION**

APPENDIX D-7
STANDARD OPERATING PROCEDURE (SOP) 7
RADIOLOGICAL PROTECTIVE CLOTHING SELECTION,
MONITORING, AND DECONTAMINATION

1.0 PURPOSE

This procedure provides the guidance for selecting protective clothing, performing personnel surveys, and decontaminating personnel.

2.0 SCOPE

This procedure will be used by Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors while performing activities in known or suspected areas with radioactive contamination.

3.0 DEFINITIONS AND ABBREVIATIONS

Contaminated Area – Any area where removable surface contamination levels exceed the following limits in Table 3-1:

TABLE 3-1

EQUIPMENT AND MATERIAL SURFACE CONTAMINATION LIMITS

Radionuclide	Removable ¹ (dpm/100 cm ²)	Fixed ¹ (dpm/100 cm ²)
Alpha	20 α	100 α
Beta (Strontium-90)	200 β	1,000 β
Beta / Gamma	1,000 β, γ	5,000 β, γ

Notes:

¹ Limits for equipment and materials based on Regulatory Guide 1.86 (AEC, 1974)

AEC – Atomic Energy Commission

cm² – square centimeter

dpm – disintegration per minute

Types of radiation: α - alpha, β - beta, γ - gamma

Hot Particle – A discrete, minute, fragment of radioactive material.

Radiologically Controlled Area (RCA) – An area containing radioactive materials to which access is controlled to protect individuals from exposure to ionizing radiation.

4.0 PROCEDURE DETAILS

4.1 Selection of Protective Clothing

The following factors should be considered when selecting protective clothing (PC):

- The levels and types of radiological material present or expected in the work area
- The presence of chemical hazards
- The base in which the contamination is carried (dry, wet, oily)
- The work to be performed or work in progress
- The location of the contamination (e.g., floor, walls, overhead, air handling systems, sewer systems)
- The physical configuration of the work area
- Environmental conditions such as heat and humidity
- Exposure situation (vapor, pressured splash, liquid splash, intermittent liquid contact, and continuous liquid contact)
- Toxicity of the radioactive materials and/or chemical(s) (ability to permeate the skin and systemic toxicity)
- Physical properties of the contaminant (vapor pressure, molecular weight, and polarity)
- Functional requirements of the task (dexterity, thermal protection, fire protection, and mechanical durability requirements)

Table 4-1 provides guidance for the selection of PC when radiological hazards are present or suspected.

The guidelines specified in Table 4-1 for PC selection may be modified under unusual circumstances. The following are examples:

- Wet areas – Where splashing water or spray is present, use rain suits in addition to the protective clothing listed in Table 4-1. A second set of coveralls may not be necessary when a rain suit is worn.
- Standing water - In addition to the clothing requirements for wet areas, use hip boots or waders for deep standing water areas.
- Face shields – Consider for use when there is significant beta radiation or a likelihood of water splashing and respirators are not required.
- High temperature areas – Consult with the Project Health Physicist (PHP) and Site Health and Safety Specialist (SHSS).

TABLE 4-1

GUIDE FOR THE SELECTION OF RADIOLOGICAL PROTECTIVE CLOTHING

Removable Contamination Levels	Clothing for Access Only No Work *	Clothing for Work or Access During Work *
General contamination levels < 1,000 dpm/100 cm ²	Level D PPE	Level D PPE
General contamination levels > 1,000 dpm/100 cm ² , but ≤ 10,000 dpm/100 cm ²	Glove liners Gloves Booties, cloth or PVC Tyvek Rubber shoe covers**	Glove liners Gloves Booties, cloth or PVC Tyvek Rubber shoe covers**
General contamination levels > 10,000 dpm/100 cm ² , but ≤ 100,000 dpm/100 cm ²	Glove liners Gloves Booties, cloth or PVC Tyvek Cap (or hood) Rubber shoe covers**	Glove liners Gloves Booties, cloth or PVC Tyvek Cap (optional) Hood Rubber shoe covers**
General contamination levels > 100,000 dpm/100 cm ²	Glove liners Gloves (2 pair) Booties, cloth or PVC Tyvek Cap (optional) Hood Rubber shoe covers**	Glove liners Gloves (2 pair) Booties (2 pair), cloth or PVC Tyvek (2 pair) Cap Hood Rubber shoe covers**

Notes:

* Plastics or partial plastics may be required anytime water or liquid chemicals are present, such as when handling wet components.

** Composition of rubber shoe covers will be selected based on work area conditions and presence of any chemical hazards.

cm² – square centimeter

dpm – disintegration per minute

PPE – personal protective equipment

PVC – polyvinyl chloride

4.2 Procedure Process

4.2.1 Donning Protective Clothing

1. Select the appropriate PC.
2. Inspect the clothing for holes, tears, or other indications of damage. If damaged, remove PC from service.
3. Don clothing.

4.2.2 Removal of Protective Clothing

1. Remove any tape and place in the designated collection receptacle.
2. Remove outer gloves, if worn.

3. Remove coveralls, if worn, by peeling off inside out and rolling downward over the shoes or inner booties.
4. Remove booties.
5. Carefully place coveralls in the designated collection receptacle.

CAUTION: Pushing clothing or trash into an already full collection container to compress the contents is forbidden as the act can result in the potential for airborne radioactivity.

6. Have the Radiological Control Technician (RCT) perform a personnel exit survey.

The sequence for protective clothing removal may vary from that described above:

- At the discretion of the RCT, providing job coverage
- As designated in the assigned Radiation Work permit (RWP)
- Dependent upon radiological and hazardous material conditions encountered during the work evolution

4.2.3 Monitoring

4.2.3.1 Exit Surveys

Note: Site conditions may merit only a hand and foot survey. If this is the case, only the hands and shoe bottom are surveyed by the RCT.

1. Use the portable instrument staged for the area of concern, which should have both a visual and an audible response.
2. Ensure that the instrument is set on slow response, if available, and operating with an audible response.
3. Verify that the instrument is operational on the lowest scale and that the area background count rate is acceptable.
4. Hold the detector with the window at approximately ½ inch from the surface being monitored.
5. Move the detector over the surface being monitored at a rate not to exceed 2 to 3 inches per second.
6. If an increase in the audible response is noted, then cease detector movement and allow the meter 5 to 10 seconds to stabilize.
7. Pause (approximately 5 seconds) at the nose and mouth area to check for indications of inhalation/ingestion of radioactive material.
8. Pay particular attention to hands, feet (shoes), elbows, knees, or other areas with a high potential for contamination.
9. If no contamination can be detected as indicated by an alarm or by an audible or visual response distinguishable from background, then exit the area.
10. If an audible or visual response distinguishable from background is noted, then the RCT will further investigate to verify if contamination is present.
11. If personnel are found to be contaminated, proceed to the procedures outlined in Section 4.2.3.2.

4.2.3.2 Contaminated Personnel

1. Notify the PHP of any individual with known or suspected contamination.
2. If the contamination is on a personal article of clothing, then perform the following:
 - Survey the inside surface(s), which was against the skin.
 - Verify that no contamination was transferred to the skin.
3. If the contamination is on the skin, then determine if the contamination is in the form of a hot particle.
4. If the contamination is a hot particle, then:
 - Quickly evaluate the particle.
 - Particle size
 - Radiation type
 - Visible characteristics
 - Attempt to collect and retain the particle for subsequent evaluation.
 - Decontaminate the individual in accordance with Section 4.2.4.
5. If the contamination is not a particle, then:
 - Evaluate the contamination levels.
 - Decontaminate the individual in accordance with Section 4.2.4.
6. Complete the applicable parts of the Personnel Contamination Report (Attachment 1).

4.2.4 Personnel Decontamination

NOTE: First aid measures take precedence over decontamination efforts. The RCT shall request support from qualified medical personnel when an injured person requires decontamination.

1. Perform personnel decontamination in a manner that prevents the spread of contamination to other body parts or the ingestion or inhalation of radioactive material.
2. Take appropriate precautions to minimize the spread of contamination when proceeding from the control point or step-off pad to the decontamination area.
3. Personnel will not be released if detectable skin contamination is present, unless authorized by the PHP.
4. When performing skin decontamination:
 - Exercise care to avoid damaging the skin.
 - If skin irritation becomes apparent, then discontinue the decontamination and notify the PHP.
 - Record results after each decontamination attempt.
 - Indicate the method of decontamination used.
 - Decontamination of ears, eyes and mouth shall be limited to damp swabs, water or saline solution rinses conducted by the individual. Further decontamination shall be performed under the direction of qualified medical personnel.

- Decontamination of nasal passages shall be limited to repeated nose blowing by the individual. Supplemental nasal irrigations shall be performed under the direction of qualified medical personnel, as required.
- Use of decontamination processes or materials other than those listed in Table 4-2 will only be performed under the specific direction of qualified medical personnel.
- Immediately report incidents of individual contamination to the PHP.
- Note the final survey results and time of survey.
- Record the area of the skin contaminated in cm² on the Personnel Contamination Report (Attachment 1).
- For contamination distributed over an area greater than or equal to the area of the probe, the measured activity may be assumed to be distributed over the probe area (area of typical pancake probe is 15.5 cm²).
- If the area of contamination is less than the area of the probe but greater than 1 cm², the actual area of the activity must be determined.
- If the contamination area is less than or equal to 1 cm², assume an area of 1 cm².
- When skin decontamination has been successfully completed, obtain the information needed to complete the Personnel Contamination Report (Attachment 1).
- Complete the applicable parts of the Personnel Contamination Report (Attachment 1).

TABLE 4-2
PERSONNEL DECONTAMINATION METHODS

METHOD	EFFECTIVE FOR	INSTRUCTIONS
Masking Tape	Dry contamination, hot particles	Apply tape to skin by lightly patting. Remove carefully.
Waterless Hand Cleaner	All skin contamination	Apply to affected area and allow it to melt onto the skin. Remove with cotton or soft disposable towel.
Soap and Tepid Water	All skin contamination except tritium	Wash area with soap and lukewarm water. Repeat until further attempts do not reduce the level. A cloth or surgical hand brush may be used with moderate pressure.
Soap and Cool Water	Tritium contamination	Wash area with soap and cool water. Repeat until further attempts do not reduce the level. A cloth may be used with moderate pressure.
Carbonated Water	All skin contamination	Apply to affected area with cotton or soft disposable towel and wipe with dry towel.
Cornmeal Detergent Paste	All skin contamination	Mix cornmeal and powder detergent in equal parts with enough water to form a paste. Rub onto affected area for 5 minutes. Remove with cotton or disposable towel. Rinse skin.
Shampoo	Hair contamination	Wash hair and rinse. Repeat as necessary.
Parafilm	All particulate contamination	Apply to affected area of skin. Remove.
Sweating	All skin contaminations	Cover affected area with impermeable cover (plastic, glove, Parafilm) to cause sweating. Remove after sweating has occurred and wipe area.

4.2.5 Radiological Follow-Up

The RCT shall:

1. Ensure that the Personnel Contamination Report (Attachment 1) has been completed.
2. Check the location of the contamination event - Contaminated Area, Hot Particle Area, clean area inside a RCA, or clean area outside RCA.
3. Enter any additional information felt to be pertinent.
4. Complete the "Contamination Event Description and Cause" sections of Attachment 1.
5. If the event was directly related to wearing PC, then complete Section A, "Event Directly Related to Wearing PC."
 - Check the appropriate Contamination Event Description.
 - Check the appropriate Basic Cause.
6. If the contamination occurred while removing PC, then complete Section B, "Event Occurred While Removing PC."
 - Check the appropriate "Contaminating Event Description."
 - Check the appropriate "Basic Cause."
7. If the contamination event was not related to wearing PC, then complete Section C, "Event Not Directly Related to Using PC."
 - Check the appropriate "Contaminating Event Description."
 - Check the appropriate "Basic Cause."
8. Review the report with the individual and have them sign and date the form.
9. Sign and date the form.

The PHP shall:

1. Review the Personnel Contamination Report to verify that all required information has been accurately recorded.
2. Complete the "Radiological Task Supervisor" section.
 - Check the appropriate brackets ([]) to indicate actions taken.
 - Enter any comments.
3. Sign and date the form.
4. Request support from the qualified medical personnel when:
 - The personnel decontamination methods provided in this procedure are ineffective; or
 - Injured personnel require decontamination.
5. Determine reimbursements and disposition of personal property that cannot be decontaminated.
6. Forward the completed Personnel Contamination Report to the SHSS for review.

The SHSS shall:

1. Review and sign the Personnel Contamination Report (Attachment 1).
2. Conduct an investigation into the cause of the contamination.
3. Conduct training on the cause of the contamination and lessons learned and preventive measures.
4. Sign and transmit the Personnel Contamination Report (Attachment 1) to the PHP for review.

5.0 RECORDS

The administrative form included in this procedure (Personnel Contamination Report) shall not be modified without the written authorization of the Project Manager and the documented concurrence of the PHP or designee. In no case shall modifications reduce the content required by the original form.

6.0 REFERENCES

<i>Number</i>	<i>Title</i>
AEC Regulatory Guide 1.86	<i>Termination of Operating Licenses for Nuclear Reactors</i>

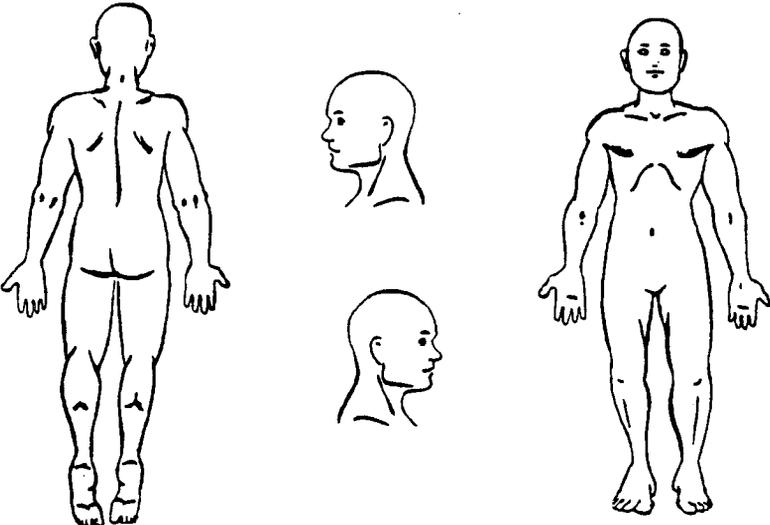
7.0 ATTACHMENTS

The following form is attached to this procedure:

Attachment 1, Personnel Contamination Report

ATTACHMENT 1

PERSONNEL CONTAMINATION REPORT

Name		Company	Date	Time
EID	Dosimeter#	Dept.	Supervisor	
Instrument		Serial #	Cal. Due Date	
Probe		Serial #	Cal. Due Date	
Location of Personnel Contamination			RWP #	
			Survey #	
				

Contamination Levels (Use # to reference drawing)					
Number	Time	Initial Count Rate	Size of Area (cm ²)	Time	Final Count Rate
Decontamination Methods	<input type="checkbox"/> Wash <input type="checkbox"/> Number of washes			<input type="checkbox"/> Other:	
	<input type="checkbox"/> Shower <input type="checkbox"/> Number of showers				
Radiological Control Technician Signature:				Date	
I acknowledge the above information represents the contamination event.					
Individual Signature:				Date	

Name

EID

CLOTHING CONTAMINATION

Item:	Max cpm	<input type="checkbox"/> Decon/Return	<input type="checkbox"/> Contaminated/Retained
Item:	Max cpm	<input type="checkbox"/> Decon/Return	<input type="checkbox"/> Contaminated/Retained
Item:	Max cpm	<input type="checkbox"/> Decon/Return	<input type="checkbox"/> Contaminated/Retained

RADIOLOGICAL FOLLOW-UP

Location of Event:	<input type="checkbox"/> Contamination Area	<input type="checkbox"/> Clean area inside RCA	<input type="checkbox"/> Clean area outside RCA
--------------------	---	--	---

Follow-up actions:

Additional information:

CONTAMINATION EVENT DESCRIPTION and CAUSE

A - Event Directly Related To Wearing PC

Contaminating Event Description

Basic Cause

- | | |
|---|---|
| <input type="checkbox"/> Contaminated by physical compromise of PC (tear, etc.) | <input type="checkbox"/> Improper donning of PC |
| <input type="checkbox"/> Contamination penetration of intact PC | <input type="checkbox"/> Improper PC use related to worker knowledge/experience |
| <input type="checkbox"/> Contamination came from PC | <input type="checkbox"/> Work area not deconned to extent practicable |
| <input type="checkbox"/> Contaminated skin by touching contaminated item | <input type="checkbox"/> Practical limitation of available alternatives |
| <input type="checkbox"/> Contamination came from contaminated liquid | <input type="checkbox"/> Improper PC requirement on RWP |
| <input type="checkbox"/> Contamination came from airborne radioactivity | <input type="checkbox"/> Improper control by RCT of worker activity in PC |
| | <input type="checkbox"/> Improper laundry/monitoring of PC |

B - Event Occurred While Removing PC

Contaminating Event Description

Basic Cause

- | | |
|---|---|
| <input type="checkbox"/> Contaminated during removal of hood | <input type="checkbox"/> Lack of knowledge in proper methods to remove PC |
| <input type="checkbox"/> Contaminated during removal of respiratory equipment | <input type="checkbox"/> Lack of knowledge in proper methods to remove respirator |
| <input type="checkbox"/> Contaminated during removal of outer PC | <input type="checkbox"/> Worker actions while removing PC - accident |
| <input type="checkbox"/> Contaminated during removal of inner PC | <input type="checkbox"/> RCT technician actions |
| <input type="checkbox"/> Contaminated during removal of plastics | <input type="checkbox"/> Improper monitoring of PC |
| <input type="checkbox"/> Contamination came from airborne radioactivity | |

C - Event Not Directly Related To Using PC

Contaminating Event Description

Basic Cause

- | | |
|--|--|
| <input type="checkbox"/> Contaminated while in area designated as clean RCA | <input type="checkbox"/> Noncompliance with postings/rad controls |
| <input type="checkbox"/> Contaminated while in area designated clean non - RCA | <input type="checkbox"/> Improper monitoring/control of rad material by worker |
| <input type="checkbox"/> Contaminated by liquid | <input type="checkbox"/> Improper actions at work area (sitting, lying) |
| <input type="checkbox"/> Contamination spread to area and not identified | <input type="checkbox"/> Accidental contact with contamination beyond worker control |
| <input type="checkbox"/> Improper control of airborne radioactive material | <input type="checkbox"/> Surveys not appropriate for existing conditions |

Health Physics Supervisor

- | | |
|---|--|
| <input type="checkbox"/> Interview with job coverage RCT | <input type="checkbox"/> Released with residual contamination |
| <input type="checkbox"/> Exclude individual from further RCA access | <input type="checkbox"/> Initiated skin dose calculation |
| <input type="checkbox"/> Discussed with individual and supervisor | <input type="checkbox"/> No further action required, routine close out |

PHP

Print

Sign

Date

APPENDIX D-8

SOP 8, DECONTAMINATION OF EQUIPMENT AND TOOLS

APPENDIX D-8

STANDARD OPERATING PROCEDURE (SOP) 8

DECONTAMINATION OF EQUIPMENT AND TOOLS

1.0 PURPOSE

This procedure provides instruction and methods for the decontamination of equipment and tools that are contaminated with radiation.

2.0 SCOPE

This procedure provides the methods Tetra Tech EC, Inc. (TtEC) personnel and its subcontractors will use for decontamination of equipment and tools that are contaminated with radioactive material.

3.0 DEFINITIONS AND ABBREVIATIONS

Decontamination – The processes whereby contamination can be safely and effectively removed from equipment and tools.

HERCULITE® – A plastic or polyethylene floor covering and containment material used for decontamination operations. HERCULITE is a brand name.

Material Safety Data Sheet (MSDS) – Manufacturer directions, safety information and limitations for use of decontamination-related solvents or cleaning solution.

4.0 PROCEDURE DETAILS

4.1 General

4.1.1 Precautions

The following precautions shall be observed during decontamination activities:

- Decontamination of contaminated tools or equipment shall be performed under the supervision of the Radiological Control Technician (RCT) providing the job coverage.
- Controls to contain the spread of loose contamination during the decontamination activity shall be planned and established prior to the decontamination of equipment, material and tools.
- Use of chemicals or solvents for decontamination purposes that have the potential to produce mixed waste shall be avoided whenever possible. Use of these chemicals or solvents requires the prior approval of the Project Health Physicist (PHP) and Radiological Affairs Support Office (RASO).
- Survey instruments that will be used to survey suspected contaminated equipment or tools should be protected (wrapped in plastic, etc.) against possible contamination before use.

- Abrasive measures should only be applied to surfaces that are not critical for operation of devices being returned to working condition.
- Electric power tools should not be used on a wet working surface. Liquids will be kept away from electric power tools.

4.1.2 Limitations

The following limitations apply to decontamination activities:

- Protective clothing worn by the personnel involved in decontamination activities as determined by the PHP.
- Decontamination cleaning solvents/solutions shall only be used in accordance with the directions and limitations listed on the manufacturer-supplied MSDS.
- Contamination controls shall be observed throughout a decontamination operation.
- Radiation and contamination surveys shall be performed in accordance with the provisions of Appendix D-6, Radiation and Contamination Surveys.
- Release of equipment and tools from the decontamination area shall be performed in accordance with Appendix D-5, Release of Materials and Equipment from Radiologically Controlled Areas.

4.2 Pre-Decontamination Preparation

The following steps shall be used for pre-decontamination preparation:

1. The PHP, or designee shall review available data regarding the item(s) requiring decontamination and develop a decontamination approach based on conditions of the Radiation Work Permit (RWP) and the cost-effectiveness of the operation versus disposal costs.
2. A radiological survey shall be performed to identify the level of radioactive contamination that is present by an RCT on objects that are to be removed from a controlled area.

4.3 Establishment of the Decontamination Area

The PHP, working with the Project Manager, shall determine a location for setup of the decontamination area. As applicable to the specific decontamination activity being performed, the decontamination area may consist of and contain one or more of the following (as needed):

- Covered floor surfaces. A double-layer of HERCULITE (or equivalent) may be laid on the floor at the direction of the RCT.
- Covered (HERCULITE or equivalent) wall surfaces.
- Engineering controls (high-efficiency particulate air [HEPA] ventilation, vacuum cleaners, containment tent walls, glove bags, etc.). Engineering controls shall be determined on the basis of the as low as reasonably achievable (ALARA) philosophy.
- Safe, sturdy work stations with contamination-resistant surfaces, tables that will support decontamination attempts on heavy pieces of equipment.
- Adequate lighting, electrical and compressed air supply for the operation of electrical and/or pneumatic-driven equipment.

- Overhead lifting equipment.
- Adequate supply of approved cleaning solutions and solvents; adequate supply of decontamination equipment such as:
 - Light-duty decontamination equipment such as paper wipes, paper towels, masslin towels, etc.
 - Medium- to heavy-duty decontamination equipment such as scrub pads, wire brushes, steel wool, files, sandpaper, etc.
 - Fully stocked hand tool kit for disassembly of contaminated equipment
 - Power tools, such as drills, saws, needle-guns, electric screwdrivers, etc.
 - Radioactive material storage bags and stickers
 - Buckets, barrels or drums for the storage of contaminated liquids, sludges or slurries
 - Blotter paper or sorbent
 - Approved absorbent material such as oil dry
 - Storage drums/bags for the storage of contaminated protective clothing
 - Proper surveillance instruments (air monitor/sampler, contamination monitor, friskers, exposure rate meter, etc.)
 - Adequate supply of personal protective clothing, gloves, respiratory equipment
 - A designated area within the decontamination area for the segregation of radioactive waste
 - Fire extinguisher(s)

4.4 Item Preparation for Decontamination

Contaminated or controlled items should always be escorted under the direction of a RCT to the decontamination area.

If an item is wrapped, position it so that the written information on the wrapping is visible and then perform the following:

- The RCT shall direct the removal of the item from the wrapping in such a manner (rolling plastic wrapping inside out, etc.) to control the spread of contamination.
- An item that is highly contaminated with removable contamination may need to be misted with an approved liquid to minimize the possibility of creating airborne contamination.
- Once the item has been removed from the wrapping and has been properly positioned, discard the wrapping as radioactive waste.

The following conditions shall be considered for the decontamination of equipment and tools:

- Any equipment with inaccessible areas shall be dismantled so that all surfaces are accessible for decontamination and survey.
- Decontamination shall be performed in a safe, effective manner.

- The RCT shall be notified immediately if the job conditions change (e.g., suspected asbestos is found, the presence of mercury in a switch or a light bulb, a fluid leak, or any other special circumstances).
- A fire watch shall be assigned to watch if any spark-producing decontamination techniques (grinding, etc.) are used. There shall be a dedicated fire extinguisher located within the decontamination area.
- The decontamination area shall remain organized and free of debris. The Radiological Control/ Decontamination Technicians shall "clean as they go."
- Air monitoring for airborne radioactivity shall be conducted as needed or directed by the PHP.
- A HEPA vacuum cleaner may be used during the decontamination operation.

4.5 decontamination of removable Contamination

When an item is properly positioned for decontamination and the pre-survey activities have been completed, the RCT will perform one or more of the following activities in accordance with the decontamination action approach approved by the PHP:

- Moisten the surface of the item with an approved liquid.
- Fold a paper or cloth wipe into sections, using one surface of the wipe; gently wipe contamination off in one direction away from the user's body to reduce the possibility of personnel contamination.
- Re-fold the paper or cloth wipe so that a clean surface is available to prevent cross-contamination and continue until item is ready for survey.
- For some equipment or tools, duct tape will effectively remove removable contamination. Wrap the duct tape loosely around the gloved hand, adhesive side out. Roll the tape over the contaminated area.

4.6 Decontamination of Fixed Contamination

There are many techniques that can be used to remove fixed contamination. The general idea is to remove the material that is fixing the activity to the surface, or remove a very thin layer of the surface material. It is very important to note that fixed contamination decontamination methods can and do result in the creation of removable surface contamination. This creates a condition that may generate airborne radioactive materials. The activities should be controlled in such a manner that airborne radioactivity is minimized. Air sampling shall be performed during these operations to properly evaluate any resultant airborne radioactivity.

For the purposes of this procedure, the potential removal techniques have been divided into the following two categories:

- Abrasive hand decontamination

- Power tool decontamination

In addition, the following methods could be used, but are not defined in this procedure and would require the development of a Task-specific Plan or Work Instruction:

- Machine decontamination (use of abrasive bead blasters, grit blasters, high-pressure water wash systems, etc.)
- Cleaning solutions/solvents (use of ultrasonic cleaners, acid baths, electropolishing, etc.)

The actual method or combination of methods applied will be in accordance with the decontamination approach approved by the PHP.

4.6.1 Abrasive Hand Decontamination

Abrasive hand decontamination shall be performed in the following manner:

1. Remove as much removable contamination as possible as indicated in Section 4.5 of this procedure.
2. Moisten the surface of the item(s) to help contain contamination.
3. Use an abrasive cleaning tool (e.g., sandpaper, steel wool, steel brush, hand grinder, etc.) to loosen fixed contamination. Clean in one direction only, away from the body to prevent personnel contamination.
4. Continue to moisten the surface of the item(s) to contain contamination.
5. Remove as much of the loosened contamination as possible as per Section 4.5 of this procedure.

4.6.2 Power Tool Decontamination

Power tool decontamination shall be performed under the direction of the RCT, with concurrence from the PHP.

4.6.2.1 Electric Power Tools

Electric power tools that may be used in decontamination operations are:

- Drills – used to drill out contaminated areas, to disassemble contaminated components, and when used with grinding wheels or disks, may be used as an abrasive tool
- Saws – used to separate contaminated pieces from clean pieces
- Grinders – used to grind fixed contamination from surfaces
- Electric screwdrivers – used in the disassembly of component parts

4.6.2.2 Air-powered Tools

Air-powered tools that may be used in decontamination operations are:

- Needle gun – a pneumatic tool that can remove contamination from concrete and/or steel surfaces
- Socket tools or impact hammer – used in disassembly of component parts
- Jackhammer/rotary hammer – a pneumatic tool which can remove contamination from concrete and/or steel surfaces

4.6.2.3 Decontamination of Power Tools

Power tool decontamination shall be performed in the following manner:

1. Remove as much removable contamination as possible as per Section 4.5 of this procedure.
2. Moisten the surface of the item lightly to help contain contamination. Use a spray bottle for moistening.
3. Whenever feasible, the use of containment devices (e.g., glove box, etc.) should be used to contain the spread of contamination when using power tools for decontamination operations.
4. Use the power tool to remove fixed contamination. Clean in one direction only and away from the body to prevent personnel contamination.

4.7 Post-Decontamination

Following decontamination procedures, the RCT shall perform a release survey. The survey will include the work area and any tools, equipment and materials used during decontamination activities and shall be conducted in accordance with Appendix D-5, Release of Materials and Equipment from Radiologically Controlled Areas. Post-decontamination release shall be performed as follows:

1. If the item satisfies the criteria for release, remove the item to a holding area and document results.
2. If the item remains contaminated, inform the PHP and repeat the decontamination.
3. If the item remains contaminated, attempt a third decontamination only by direction of the PHP.

If an item cannot be effectively or economically decontaminated, the Project Manager may direct the crew to volume-reduce (reduce to component parts) the equipment, material, or tools as much as possible. If the item is expendable, the individual parts may be surveyed and released.

Any tools, equipment or materials that cannot be decontaminated will be packaged in an appropriate waste container for subsequent disposal as radioactive waste. The waste containers will be staged in an area agreed upon by RASO and the Department of the Navy.

After decontamination operations have been completed, an RCT shall perform a release survey of the decontamination area in accordance with Appendix D-6, Radiation and Contamination Surveys and Appendix D-5, Release of Materials and Equipment from Radiologically Controlled Areas.

5.0 RECORDS

The records generated by the use of this procedure are documented in accordance with the provisions of Appendix D-5, Release of Materials and Equipment from Radiologically Controlled Areas.

6.0 REFERENCES

<i>Number</i>	<i>Title</i>
Appendix D-5, SOP 5	<i>Release of Materials and Equipment from Radiologically Controlled Areas</i>
Appendix D-6, SOP 6	<i>Radiation and Contamination Surveys</i>

7.0 ATTACHMENTS

None.

APPENDIX D-9
SOP 9, RADIOLOGICAL RECORDS

APPENDIX D-9

STANDARD OPERATING PROCEDURE (SOP) 9

RADIOLOGICAL RECORDS

1.0 PURPOSE

The purpose of this procedure is to define Tetra Tech EC, Inc. (TtEC) standards for the maintenance and retention of radiological records including personal protection.

2.0 OVERVIEW

Radiological records provide valuable historical data, radiological conditions, and exposure for use in future site operations, health studies, and litigation supports. The following types of radiological records are required to be maintained.

- Radiological control procedures
- Individual radiological doses
- Internal and external dosimetry policies and procedures
- Radiological control (RadCon) Personnel Training (course records and individual records)
- As low as reasonably achievable (ALARA) program implementation records
- Radiological instrumentation test, repair, and calibration records
- Radiological surveys
- Area monitoring dosimetry results
- Radiological work permits
- Radiological incident reports
- Facility design and control actions taken to maintain exposures ALARA
- The results of internal audits and other reviews of program content and implementation
- Written declarations of pregnancy, including the estimated date of conception
- Changes in equipment, techniques, and procedures used for monitoring
- Records for release of material to controlled areas
- Field logbooks

Radiological records are transferred to the project file located in San Diego following completion.

3.0 RESPONSIBILITIES

3.1 Project Manager

The Project Manager is responsible for:

- Ensuring effective implementation of the RadCon records management program and that the program is in compliance with regulatory requirements.

3.2 Project Health Physicist

The Project Health Physicist:

- Directs and assists Radiological Control Technicians and project personnel in proper completion of radiological records.
- Ensures that records are in compliance with the quality standards outlined in this procedure.
- Ensures timely and thorough review of records, in accordance with this procedure, prior to approval.
- Approves records with verifiable signature and date once records meet the quality standards.
- Ensures that records are transferred or transmitted to the San Diego office following completion.

3.3 Other Project Personnel

Other project personnel will:

- Create, review, or transmit radiological records for retention.
- Ensure that all document quality standards are met.

4.0 REQUIREMENTS

Records resulting from the implementation of the Radiological Survey Work Plan are comprised of legal and historical documentation. Therefore, all records shall meet the quality standards as outlined in this procedure. All records must be retrievable and maintained for their prescribed retention time.

Completed records awaiting transfer to storage shall be stored in an appropriate manner to minimize loss and damage that could result from exposure to weather, fire, or other conditions.

The signature and initials of all personnel who sign RadCon records shall be on file. This file shall be updated when a change in personnel warrants.

All personnel who create, review and approve radiological records must sign and date the record and follow all quality standards in accordance with this procedure.

Once a document has been created, reviewed, and signed by appropriate supervision, it is a completed radiological record. Technical errors or omissions subsequently identified in a completed record may be corrected by creating a supplemental record that includes traceability to the original document.

If working copies of records are used for reference, store them separately from the original.

5.0 DOCUMENT QUALITY STANDARDS

Records shall be legible and completed with an indelible ink that provides reproducible and legible copies. Records shall be dated and contain a verifiable signature of the originator. Errors shall be corrected by marking a single line through the error and by initialing and dating the correction. Radiological records shall not be corrected using an opaque substances. Shorthand, or other nonstandardized terms, may not be used.

To ensure retrievability, each record shall clearly indicate:

- Identification of the facility
- Specific location

- Function and process
- Document number (if applicable)

The quantities used in records shall be clearly indicated in standard units (curie, rad, rem, disintegrations per minute [dpm]), including multiples and subdivisions of these units.

6.0 PROCEDURE

6.1 Preparation of Radiological Records

Prior to preparing a document for which a standard form exists, verify that the form is current. Verify that copies of master forms are in good quality.

Prepare the document in accordance with the applicable guidance for that specific document, if any, and in accordance with the quality standards established by this procedure.

Review the completed document for accuracy of calculations, legibility, proper units, proper forms, and so forth. The document should meet all quality standards before it is submitted for final review and approval.

6.2 Review of Records

Review radiological documents in a timely manner. Supervisory reviews should focus on identification of trends, validity of recorded data and information, and identification of originators.

Subsequent quality reviews should verify that documents are complete, legible, and in compliance with the quality standards outlined in this procedure.

6.3 Approval of Records

Verify that all documents are correct and in compliance with this procedure and applicable regulatory requirements prior to transmittal to storage.

6.4 Individual Monitoring

The records required by this procedure will be protected from public disclosure because of their personal privacy nature. The results of individual external and internal dose monitoring that is performed will be recorded at least annually, including doses received during planned special exposures, unplanned doses exceeding TtEC dose limits, and authorized emergency exposures.

Monitoring records will be maintained on Nuclear Regulatory Commission (NRC) Form 5 or in clear and legible records containing all of the information required by NRC Form 5.

- Be sufficient to evaluate compliance with RP2-2, Standards for Internal and External Exposure.
- Be sufficient to provide dose information necessary to complete reports required by RP2-9, Reports to Individuals.
- Data necessary for future verification or reassessment of the recorded doses will be recorded.
- Individual monitoring records that are identified with a specific individual will be readily available to that individual.

6.4.1 Monitoring Records

For personnel whose occupational dose is monitored, reasonable efforts will be made to obtain complete records of prior years for occupational internal and external doses. If complete records documenting previous occupational dose during the year cannot be obtained, a written estimate signed by the individual may be accepted to demonstrate compliance.

External dose records include the following:

- The effective dose equivalent from external sources of radiation (deep dose equivalent may be used as effective dose equivalent for external exposure).
- The lens of the eye dose equivalent.
- The shallow dose equivalent to the skin.
- The shallow dose equivalent to the extremities.

Internal doses from intakes received during the year include the following:

- An estimate of the identify intake of radionuclides.
- Committed effective dose equivalent.
- Committed dose equivalent to any organ or tissue of concern.

The summation of external and internal doses includes:

- Total effective dose equivalent in a year.
- For any organ or tissue assigned an internal dose during the year, the sum of the deep dose equivalent from external exposures and the committed dose equivalent to that organ or tissue.
- The dose equivalent to the embryo/fetus of a declared pregnant worker will be located with the records of dose to the declared pregnant woman.
- Incident reports, findings, conclusions, or other information describing off-normal events in which the employee was involved. These include, but are not limited to, cases of accidental exposures, skin contamination, failure of personal protective equipment (PPE), exceeding TtEC dose limits (unauthorized), injuries inside a radiological area, positive bioassay, or lost dosimetry.

6.4.2 Other Monitoring Records

The following other information will be documented and maintained:

- Results of area monitoring as specified in RP2-3 and RP2-7
- Results of dosimetry, surveys, air sampling/monitoring and bioassay results used to determine individual doses
- Results of monitoring for the release and control of material and equipment, as required by RP2-7, Radioactive Contamination Control; the records of released property will include:
 - (a) A description or identification of the property
 - (b) The date of the last radiation survey
 - (c) The identity of the organization and the individual who performed the monitoring operation
 - (d) The type and identification number of monitoring instruments
 - (e) The results of the monitoring operation
 - (f) The identity of the recipient of the released material
- Results of maintenance and calibration performed on instruments and equipment as required by RP2-3, Radiological Monitoring of Individuals and Areas
- Results of monitoring and documentation of approval for planned special exposures

7.0 RECORD RETENTION

All radiation records will be retained by TtEC for a minimum of 3 years from the date of the generation of the record.

8.0 REFERENCES

<i>Number</i>	<i>Title</i>
RP202	<i>Standards for Internal and External Exposure</i>
RP2-9	<i>Reports to Individuals</i>
RP2-3	<i>Radiological Monitoring of Individual and Areas</i>
RP207	<i>Radioactive Contamination Control</i>

9.0 ATTACHMENTS

None.

APPENDIX E
SCOPE OF WORK

N62473-06-D-2201
SCOPE OF WORK DATED JANUARY 16, 2006
FOR
RADIOLOGICAL SURVEY AT
INSTALLATION RESTORATION SITES 1, 2, and 32
ALAMEDA POINT, ALAMEDA, CALIFORNIA
PLOB X007

This Scope of Work issued under Contract N62473-06-D-2201, PLOB X007 for accomplishing the following services, as directed by the Contracting Officer of the Engineering Field Division Southwest, Naval Facilities Engineering Command (NAVFAC Southwest Division). The period of performance would extend from April 28, 2006 to September 30, 2006.

1.0 LOCATION

Alameda Point, Alameda, California

2.0 BACKGROUND

This work is a follow-on survey to the surveys performed under N68711-95-D-5713 Contract Task Order (CTO) number 087. That CTO, awarded on February 26, 2004, was awarded to perform radiological survey and vegetation clearance of Installation Restoration (IR) Sites 1 and 2 at Alameda.

2.1 Site 1 Background

The Navy is currently within the CERCLA Feasibility Study (FS) process for a former disposal area located at the northwestern end of Alameda Point known as Installation Restoration (IR) Site 1, Operable Unit (OU) 3, 1943-1956 disposal Area. It is proposed that Site 1 will be conveyed to the City of Alameda with the intended use as a golf course and regional park trail. This Scope of Work (SOW) addresses recent regulatory agency concerns regarding what is considered as radiological data gaps. Please see task 3 for specific objectives.

2.2 Site 2 Background

The Navy is currently within the CERCLA Remedial Investigation and FS (RI/FS) process for a former solid waste disposal site located at the southwestern end of Alameda Point known as IR Site 2 west Beach Landfill and Associated Wetlands. Site 2, OU4A is proposed to become part of the wildlife refuge. The Site 2 survey as performed under the previous contract N68711-95-D-5713 CTO 087 did not include what is historically known as the former "RAD Shack" area. due to trees with low-hanging branches. This revision will address the vegetation clearance and the survey of the RAD Shack area. Please see task 3 for specific objectives.

2.3 Site 32 Background

The Navy is currently within the CERCLA Remedial Investigation (RI) process for IR Site 32. Site 32 has no historical indication of being radiological impacted. However, during a 2004 radiological survey performed by this CTO, an elevated radiological reading was found to exist

along the boarder between IR Sites 1 and 32. Further radiological investigation is also supported by an incidental elevated radiological reading during the Site 32 remedial investigation field activities.

3.0 OBJECTIVE

The objectives of this contract are as follows:

- Provide a Site 1 work plan addendum to the original work plan (that was provided under N68711-95-D-5713 CTO 087). Where applicable, this would include procedures for the vegetation clearance for IR Sites 1 and 2 coastline, IR Site 32, and the RAD Shack area in IR Site 2.
- Conduct vegetation clearance with on-site biologist if required. The contractor will follow the vegetation clearance plan that was approved up previously by this CTO.
- Conduct radiological characterization survey at IR Site 32, IR Sites 1 and 2 shoreline areas, and the RAD Shack area in IR Site 2 in accordance with the MARSSIM. A MARSSIM Characterization Survey that meets the requirements for converting to a Class 1 survey will include sampling and/or direct measurements and scanning measurements. Sampling may include core sampling down to bay mud. The location and measurement results, at which samples and measurements (direct and scan) are taken will be data logged and geo-referenced using a laser based positioning system that is capable of providing decimeter level of accuracy from each data point (e.g., 1 radiological reading per square foot of surface area surveyed).
- Conduct an environmental Dosimetry Study via the use of thermal luminescent devices. The contractor shall define the parameters of the study and include details in the work plan addendum for approval to accomplish this goal.
- Provide a Survey Report that will include all radiological findings from this characterization survey.
- Provide Site 32 preliminary radiological screening data to the Site 32 RPM and Contractor (please see task 8.2) to support the current remedial investigation.

4.0 SPECIFIC TASKS

4.1 Prepare Survey Work Plan Addendum

The contractor shall prepare a vegetation clearance and survey work plan addendum describing how the vegetation clearance and radiological surface scan will be conducted. The plan shall include all methods used and specify detection limits, if needed, and regular calibration of field instruments. The FSP shall include, but not be limited to, a Sampling and Analysis Plan, Quality Assurance Project Plan, Site-Specific Health and Safety Plan.

4.2 Perform Vegetation Clearance

Conduct vegetation clearance with the approval of an on-site biologist as directed by the Navy Natural Resource Technical Manager. Vegetation clearing will be conducted with a qualified biologist to avoid adverse impacts to sensitive species and jurisdictional wetlands. At the present

time there is no intend to conduct clearance and survey activities within the boundaries of any wetland areas. Vegetation clearing will be planned to avoid the avian nesting season. The biologists will evaluate the proposed project area prior to vegetation clearing for the presence of nesting birds. The evaluation will be conducted to prevent the “take” of nesting birds [bird species listed as Endangered, Threatened or Candidate species under Federal and California State laws, as well as certain other species identified as special status by the California Department of Fish and Game (CDFG) and species protected under the Migratory Bird Treaty Act (MBTA) will be targeted] during the vegetation clearing process.

4.3 Perform Radiological Survey

4.3.1 Perform Site 32 Surface Survey

The survey will be conducted with the coordination of the Navy Natural Resource Technical Manager and under the supervision of a qualified biologist to avoid adverse impacts to sensitive species. The contractor shall perform the 100 percent radiological characterization surface survey of all accessible areas of IR-32. Radiological instruments used shall be appropriate for detecting radium 226. The Contractor shall complete a Characterization Survey in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1, August 2000. The survey shall be based on a scenario B survey design.

The contractor shall collect and electronically store radiological results along with location coordinates of the site with a survey density equal to one gamma reading per sq. ft. of surface area. The survey will include sampling and/or direct measurements and scanning measurements. Sampling may include core sampling. The location and measurement results, at which samples and measurements (direct and scan) are taken will be data logged and geo-referenced using laser based positioning system that is capable of providing decimeter level of accuracy for each data point (e.g., 1 radiological reading per square foot of surface area surveyed). Detection criteria for this project will be indistinguishable from background for radium. Locations where activity has been determined to be above this level shall be marked and for further investigation.

If during the radiological survey a discrete source is located, the contractor shall collect the source and relocate the source in an procedure approved of by the Remedial Project Manager (RPM), the Caretaker Site Office (CSO), and the Radiological Affairs Support Office (RASO). The area will be re-surveyed after the removal to ensure that no further discrete sources remain at surface. RASO is responsible for the removal of any source collected and removal will be performed at a later date.

4.3.2 Perform Site 1 and 2 Shoreline Survey, Site 1 Dosimetry Study, and Sites 32 and Site 2 RAD Shack Survey.

The survey will be conducted with the coordination of the Navy Natural Resource Technical Manager and under the supervision of a qualified biologist to avoid adverse impacts to sensitive species. At the present time there is no intend to conduct survey activities within the boundaries of any wetland areas.

The contractor shall perform surface radiological characterization survey of the accessible shoreline/rip-rap areas above the mean low tide mark. Collect and electronically store stationary

(static) radiological measurement results along with location coordinates of the site(s) with a 100% survey density coverage of all accessible open spaces. This survey effort excludes any buildings or structures.

Instruments used shall be appropriate for detecting radium 226. The Contractor shall complete a Characterization Survey in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575, Revision 1, August 2000. The survey shall be based on a scenario B survey design. Detection criteria for this project shall be determined for the background level of radium. Locations where activity has been determined to be above this level shall be marked and for further investigation.

Perform surface radiological characterization survey of the accessible shoreline areas. Collect and electronically store stationary (static) radiological measurement results along with location coordinates of the site(s) with a survey density approximately equal to one gamma reading per every node of 1 ft. x 1 ft. grid of all accessible surface areas.

Collect and store precision dose rate measurements (Pressurized Ion Chamber – PIC) with location coordinates of the site(s) with a survey density approximately equal to one dose rate reading per every node of 1 ft. x 1 ft. grid of surface area.

Perform environmental dosimetry study of the coastal area of IR Site 1 for a period of approximately 3 months.

Using GIS software, provide survey map(s) of data results, color-coded per gamma intensity. Data set deliverable and survey methodology must be similar to previous characterization data set of surveys performed on IR Sites 1, 2 and 32.

If during the radiological survey a discrete source has been located, the contractor shall collect the source and relocate the source utilizing an procedure approved of by the Remedial Project Manager (RPM), the Caretaker Site Office (CSO), and the Radiological Affairs Support Office (RASO). The area will be re-surveyed after the removal to ensure that no further discrete sources remain at surface. RASO is responsible for the removal of any source collected and removal will be performed at a later date.

4.4 Prepare Radiological Survey Report

A survey report shall be prepared upon completion. The report shall include a short briefing of the vegetation clearance, all radiological data collected, the finding of and relocating of any discrete sources, copies of all environmental records, and other appropriate information shall be included in the survey report. The report will separate Sites 1, 2, and 32 by sections. Other report specifications are found under subtask 5.0.

4.5 Perform Project Management

4.5.1 Site Visits, Meetings, Interviews

This subtask includes cost for up to 3 meetings. The CTO leader, a senior technical staff member, risk assessor, and/or the project manager, as needed, will attend these meetings. This

task includes meetings with the Navy and agencies to keep them informed on project status and to discuss various aspects of the project. Potential topics to be discussed at meetings include removal actions, response to Navy and/or agency comments on technical reports. Meetings may also be necessary to consult with and/or gather information from other contractors. This WBS includes the effort to prepare for and attend these meetings. It also includes the effort to prepare meeting minutes, as appropriate. It is assumed that the CTO leader will attend 2 of these meetings with the Navy and/or Agencies in the San Francisco Bay area. It is assumed that the project manager and/or technical staff will attend 1 of these meetings with the Navy and/or Agencies in San Diego. Where deemed appropriate by the Navy, these meetings can be performed via telecom.

4.5.2 Task Management and Quality Control

Administration and management activities that are required for supervision or support of technical work performed for this SOW are as follows:

- managing and monitoring staff assigned to perform specific work, or support activities;
- assuring appropriate levels of quality control for the various tasks and activities performed under this SOW;
- overseeing customer relations, including prompt response to issues and concerns, and effectively communicating other issues related to cost, schedule, and technical performance of the SOW; and other Program Management Office (PMO)-designated or SWDIV-designated efforts.

5.0 SURVEY REPORTS

This task involves efforts relating to the preparation of the technical reports. This task includes data presentation, writing the report, internal review and quality control, and revising the report based on Navy and agency comments. Specific activities are discussed in the following subtasks.

5.1 Data Presentation

Under this subtask, data summary tables and graphics for presentation in the removal action reports, will be prepared as applicable. Specifically, this includes the efforts related to the development, production, editing, and printing of figures, tables, and any other graphics for inclusion in the reports.

Using GIS software, provide survey map(s) of data results, color-coded per gamma intensity. Data set deliverable and survey methodology must be similar to previous characterization data set of surveys performed on/over IR-1 and IR-2.

5.2 Writing the Report

This SOW provides for a Survey Work Plan addendum.

The contractor shall prepare multiple versions of the reports. The sequence of report versions for this SOW will go from preliminary draft, to draft, to draft final to final.

5.2.1 Reviewing and Providing QC Efforts and Internal Technical Review

This subtask includes internal peer review and quality control checks by the project manger, CTO leader, and senior staff members to ensure technical quality and consistency.

5.2.2 Printing and Distributing the Reports

This subtask includes effort for technical and administrative staff for printing, copying, checking, and distributing each report version (preliminary draft, draft, draft final and final). These reports will be submitted as hard copy format and on CD-ROM as stated Section 6.0, Submittals and Schedules.

5.2.3 Revising the Report Based on Navy and Regulatory Agency Comments

This subtask includes revision to the preliminary draft, draft, and draft final report versions based on Navy and agency review comments. Following established review procedures, the Contractor will prepare responses to comments for Navy review prior to their inclusion in the final reports.

6.0 SUBMITTALS AND SCHEDULE

The final submittals and schedule will be determined after the pre-proposal conference.

Table 6-1 Proposed Sample Matrix

Deliverable	Number of Hard Copies		Number of Electronic Copies *	Due (Calendar Days From Milestone)**
	SWDIV	Agencies		
Preliminary Draft Work Plan	3			30 days
Draft Work Plan	5	6		30 days
Draft Final Work Plan	5	6		60 days
Final Work Plan	5	6*	5	30 days
Preliminary Draft Survey Report	3			30 days
Draft Survey Report	5	6		30 days
Draft Final Survey Report	5	6		60 days
Final Survey Report	5	6*	5	30 days

*electronic copies to RPM

** Due dates are flexible pending the expediency of Navy and Agency reviews.

7.0 SPECIAL CONDITIONS

- All detailed instructions/directions associated with this CTO shall be provided by the RPM and as approved by the Contracting Officer.

- The contractor shall perform all tasks in accordance with the work plan to be submitted with the proposal for this CTO and as approved by the RPM during negotiations.
- The CTO leader and Project Manager will be responsible for the above-listed activities. CTO-specific secretarial/administrative, technical editing and word processing, and document control labor will also be performed in support of this task.
- All basic contract requirements other than those specifically modified by this CTO remain in full effect; performance under this CTO will be in accordance therewith.
- RASO shall be the technical point of contact for all radiological issues associated with this project.
- Consult with Navy Natural Resources Technical Manager concerning vegetation clearance and radiological surveys in/around identified seasonal wetlands areas. Timeline sensitivities exists due to the Least Tern nesting season between April and October.
- Discrete sources shall be relocated as described in subtask 4.3.1 and 4.3.2 reducing risks in these public accessible areas.

8.0 CONTRACT ADMINISTRATION DATA

8.1 GENERAL FUNDING INFORMATION

Type of Funding: BRAC

8.2 POINTS-OF-CONTACT

Remedial Project Manager (RPM):

Name: Claudia Richardson, Attn: Code 06CA.CR
 Address: BRAC Program Management Office West
 1455 Frazee Road, Suite 900
 San Diego, California 92108-4310
 Phone : (619) 532-0935 {Fax}619-532-9858
 Email : claudia.richardson.ctr@navy.mil

Contract Specialist (CS), Naval Facilities Engineering Command, Southwest:

Name: Joyce Howell-Payne, Attn: Code 06CA.JHP
 Address: BRAC Program Management Office West
 1455 Frazee Road, Suite 900
 San Diego, California 92108-4310
 Phone: (619) 532-0923 {FAX}(619) 532-9858
 Email : joyce.howell-payne@navy.mil

BRAC Environmental Coordinator (BEC):

Name: Thomas L. Macchiarella, Attn: Code 06CA.TM
 Address: BRAC Program Management Office West
 1455 Frazee Road, Suite 900
 San Diego, California 92132-5181

Phone: (619) 532-0965 {FAX}(619) 532-9858
Email : thomas.macchiarella@navy.mil

Radiological Affairs Support Office (RASO):

Name: Matthew Slack
Address: Building 1971
NWS P.O. Drawer 260
Yorktown VA 23691-0260
Phone: (757) 887-4692
Email : matthew.slack@raso.navy.mil

Activity POC:

Name: Doug DeLong, CHMM
Environmental Compliance Manager
Address: DoD SWDIVNAVFACENGCOM, CSO SF Bay Area
10 Palm Ave; B-1 Suite 161 (Treasure Island)
San Francisco, CA 94130-1806
Phone: (415) 743-4713 (cellular) (510) 772-8832
Email : douglas.delong@navy.mil

Resident Officer in Charge of Construction (ROICC)

Name: Gregory Grace
Address: ROICC San Francisco Bay Area
Engineering Field Activity West
2450 Saratoga Street, Suite 200
Alameda, CA 94501-7545
Phone: (510) 749-5940 (cellular) (510) 755-5884
Email : gracegi@efawest.navfac.navy.mil

Natural Resources Technical Manager:

Name: Shannon Bryant
BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92132-5181
Phone: (619) 532-0948 {FAX}(619) 532-9858
Email : Shannon.Bryant@navy.mil

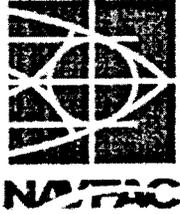
Site 32 Remedial Project Manager (RPM):

Name: Andrew Baughman, Attn: Code 06CA.AB
Address: BRAC Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310
Phone : (619) 532-0902 {Fax}619-532-9858
Email : Andrew.Baughman@navy.mil

Site 32 Contractor Bechtel:

Name: Michelle Dermer

Address: Bechtel National, Inc.
50 Beale Street
San Francisco, California 94105-1895
Phone: (415) 768-2832 {FAX}(415) 768-5128
Email : msdermer@bechtel.com



DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CALIFORNIA 92132-5190

IN REPLY REFER TO:

4280
Ser 06CA.JHP/0035
Jan 18, 2006

VIA ELECTRONIC TRANSMISSION

TETRA TECH EC INC.
Attn: Ms. Carol Hart
1230 Columbia Street, Suite 640
San Diego, CA 92101

Dear Ms. Hart:

**Subj: N62473-06-D-2201. REMEDIAL ACTION CONTRACT (RAC IV) FOR ENVIRONMENTAL
REMEDICATION
SERVICES AT DOD INSTALLATIONS IN AK, AZ, CA, NM, NV, OR, WA, AND OTHER DOD
INSTALLATIONS NATIONWIDE (PLOB X007 RADIOLOGICAL SURVEY AT INSTALLATION
RESTORATION SITES 1, 2, AND 32 AT ALAMEDA POINT, ALAMEDA, CALIFORNIA)**

In accordance with the terms and conditions of the basic contract, the Government hereby requests a technical and price proposal for services as described in the enclosed Statement of Work (SOW), dated January 16, 2006. The technical and cost proposals are due on **February 9, 2006** by close of business to Ms. Joyce Howell-Payne, Naval Facilities Engineering Command, Southwest, BRAC Program Management Office West, 1455 Frazee Road, Suite 900, San Diego, California or by electronic mail to: joyce.howell-payne@navy.mil. A Contract Negotiation Board will review your cost proposal and if negotiation is required, you will be contacted by telephone to set up a mutually convenient time.

Please review the SOW to assess and identify tasks that can be performed by Small Businesses or Small Disadvantaged Business, and utilize these firms to the maximum extent practicable. All subcontractor costs and pricing data shall be certified and submitted as part of your proposal or subcontractor's consent package, except as provided by contract clause 52.215-12. This request for proposal constitutes authorization to proceed with the cost proposal preparation only associated with the enclosed SOW. Funding for this effort has been established by CTO 0002 and costs shall be identified as "BRAC" for invoicing purposes. This request for proposal does not constitute a notice to proceed with the work identified by the SOW, other than preparation of your cost proposal. Work authorization will be provided separately by issuance of a properly executed Contract Task Order (CTO) on a DD Form 1155 by the Contracting Officer.

Please contact the Remedial project Manager Ms. Claudia Richardson for technical questions at (619) 532-0935. For contractual questions, please contact Ms. Joyce Howell-Payne at (619) 532-0923.

Sincerely,


C.W. DEPEW
Contracting Officer

Enclosure: SOW dated January 16, 2006

APPENDIX F
SURVEY INSTRUMENTATION INFORMATION

APPENDIX F

SURVEY INSTRUMENT INFORMATION

Instrument (Serial Number)	Planned Use	Minimum Detectable Scan/Fixed Activities and Concentrations	Calibration Date	Calibration Due Date
Eberline E-600 Smart Portable	Scaler/ratemeter used for scan and static surveys	NA	NA	NA
Ludlum Model-2350-1 Data Logger	Data logger used for scan and static surveys	NA	NA	NA
Ludlum Model-2360 Data Logger	Data logger used for scan and static surveys	NA	NA	NA
Ludlum 2221 Scaler/Ratemeter	Scaler/ratemeter used for scan and static surveys	NA	NA	NA
Ludlum 44-10 NaI probe	Gamma scan and static surveys	<u>Scan MDCs:</u> 2.8 pCi/g (²²⁶ Ra) 1.8 pCi/g (²³² Th) (NUREG-1575)	NA	NA
Ludlum 43-89 Large-area scintillation, (100 cm ²)	Static surveys	<u>Fixed MDCs:</u> 10 dpm/100 cm ² (²²⁶ Ra) 250 dpm/100 cm ² (⁹⁰ Sr) (NUREG-1575)	NA	NA
Eberline SHP-360	Static surveys	<u>Fixed MDA (beta)</u> 1,000 dpm/100cm ² (NUREG-5849) <u>Scan MDC (beta)</u> 3,000 dpm/100 cm ² (NUREG-5849)	NA	NA
Eberline SPA-3	Gamma scan and static surveys	<u>Scan MDCs:</u> 2.8 pCi/g (²²⁶ Ra) 1.8 pCi/g (²³² Th) (NUREG-1575)	NA	NA
Thermo MicroRem Meter	Dose rate	Minimum detectable dose rate 2 µrem/hr (Thermo)	NA	NA
Portable HPGe system	Gamma energy analysis	NA 40-70 percent efficiency relative to 3-inch by 3-inch NaI	NA	NA

Notes:

The list above contains instrument types that are expected to be used during the survey. The table will be completed (e.g., instrument serial number, efficiency, calibration data) once the instruments have been mobilized to the site. The completed table will be provided in the Radiological Survey Report.

µrem/hr – micro radiation equivalent man per hour

cm² – square centimeters

dpm – disintegrations per minute

HPGe – High-purity Germanium

MDA – minimum detectable activity

MDC – minimum detectable concentration

NA – not available

NaI – sodium iodide

pCi/g – picocuries per gram

²²⁶Ra – radium-226

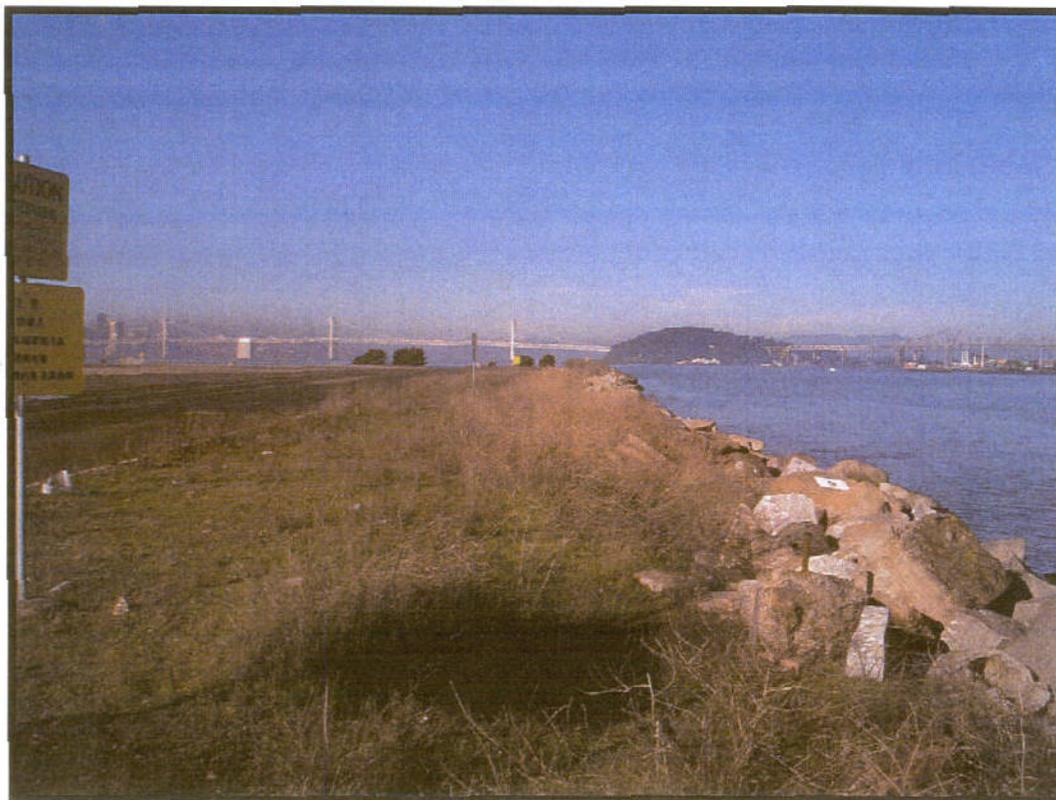
⁹⁰Sr – strontium-90

²³²Th – thorium-232

APPENDIX G
PRE-SURVEY PHOTOGRAPHS



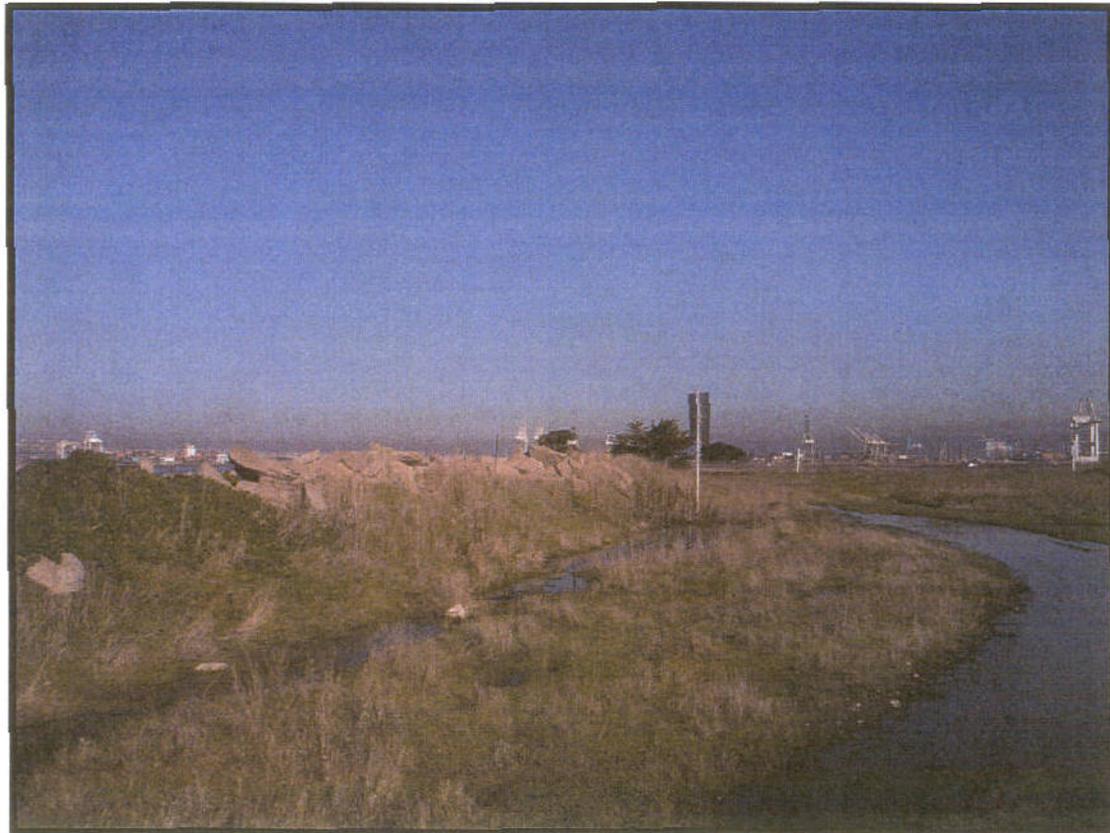
1. IR Site 1 shoreline looking northeast across to the Port of Oakland and east to the shoreline of IR Site 32.



2. IR Site 1 shoreline looking west toward Treasure Island and Bay Bridge.



3. IR Site 2 shoreline looking south toward South San Francisco.



4. Typical berm adjacent to IR Site 2 shoreline looking north.



5. Typical vegetative cover looking south along the southern berm of IR Site 2.



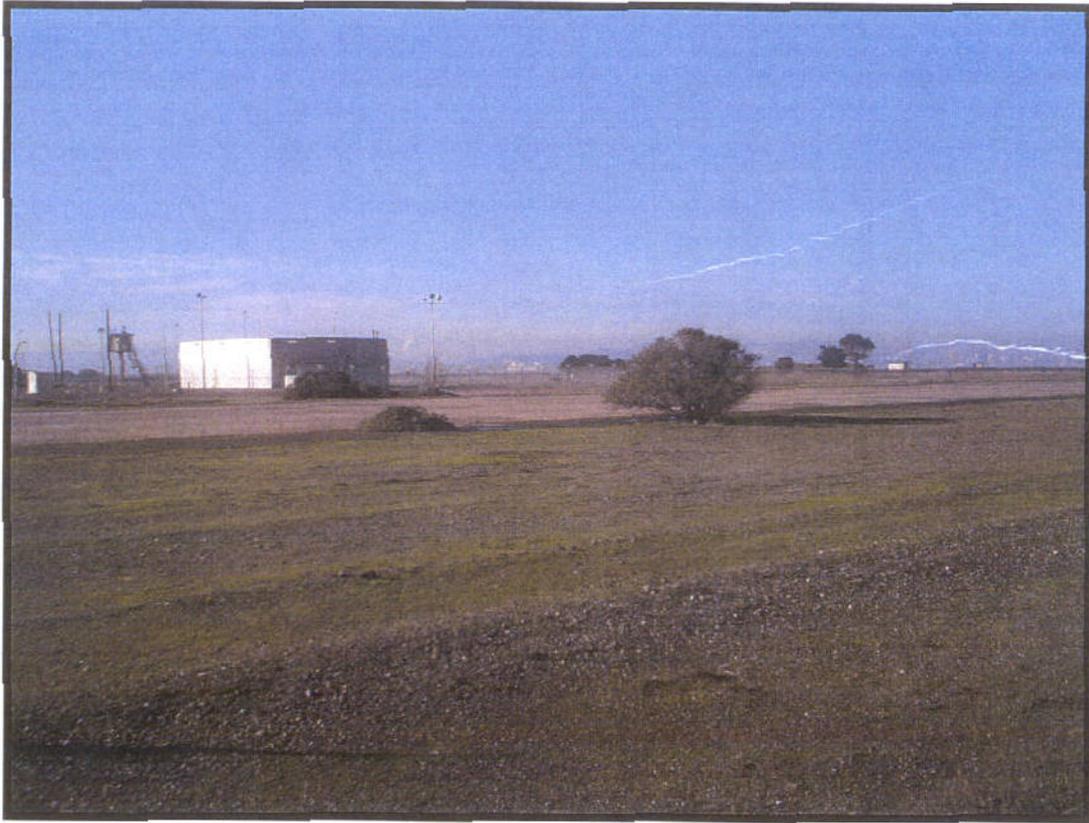
6. Typical vegetative cover looking southwest across the southeast corner of IR Site 2.



7. Typical vegetative cover looking northwest across the southeast corner of IR Site 2.



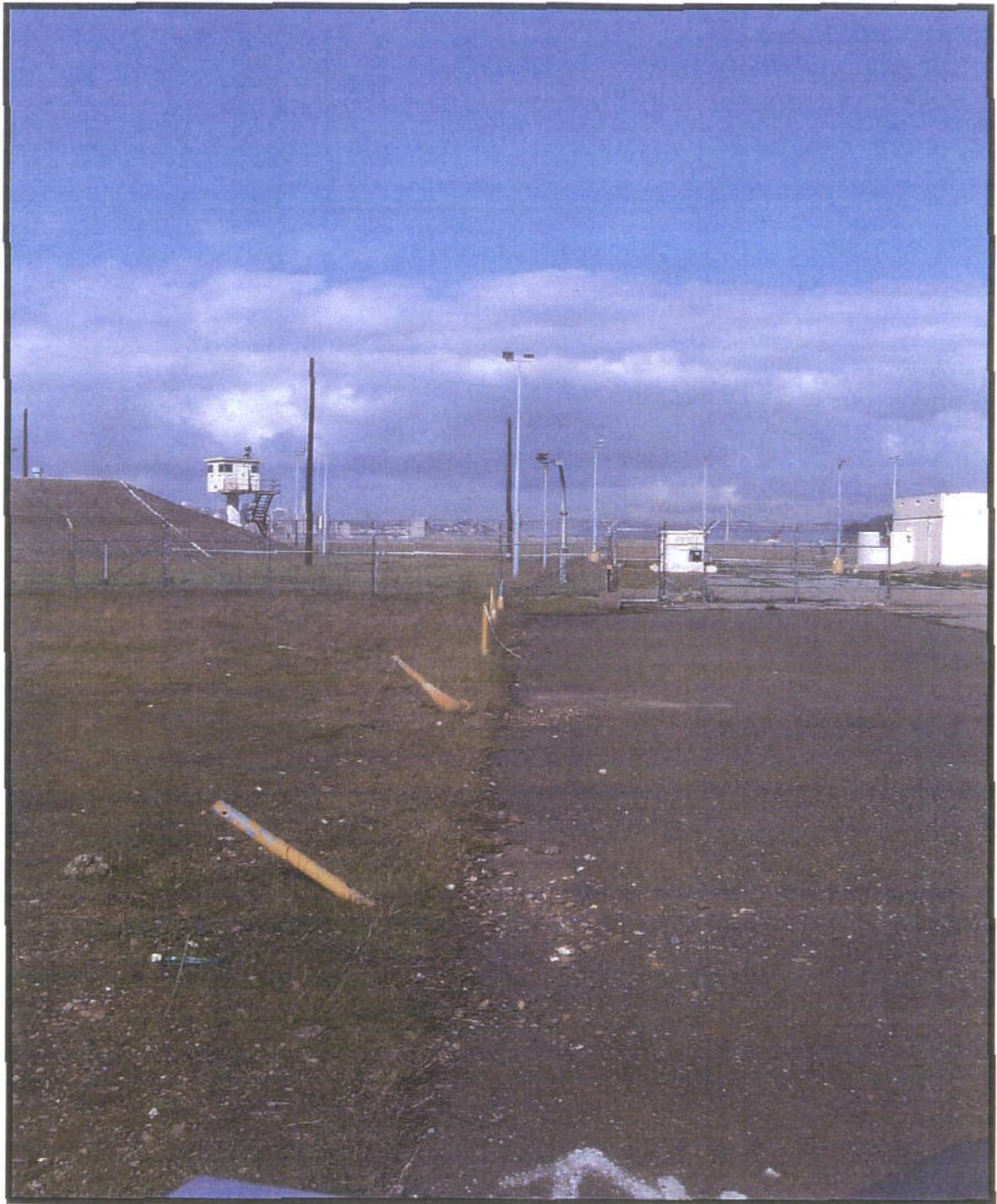
8. Typical vegetative cover looking west across the southwest portion of IR Site 2.



9. Typical vegetative cover looking southwest across the northeast corner of IR Site 32.



10. Typical vegetative cover looking toward northeastern corner of IR Site 32.



11. IR Site 32 looking west toward entrance of fenced compound that includes Building 594 and guard tower.

APPENDIX H

GLOSSARY

APPENDIX H

GLOSSARY

action level: The numerical value that will cause the *decision maker* to choose one of the alternative actions. It may be a regulatory threshold standard (e.g., Maximum Contaminant Level for drinking water), a dose- or risk-based concentration level (e.g., *DCGL*), or a reference-based standard. See *investigation level*.

activity: See *radioactivity*.

ALARA (acronym for As Low As Reasonably Achievable): A basic concept of radiation protection, which specifies that exposure to ionizing radiation and releases of radioactive materials should be managed to reduce collective doses as far below regulatory limits as is reasonably achievable considering economic, technological, and societal factors, among others. Reducing exposure at a site to *ALARA* strikes a balance between what is possible through additional planning and management, remediation, and the use of additional resources to achieve a lower collective dose level. A determination of *ALARA* is a site-specific analysis that is open to interpretation, because it depends on approaches or circumstances that may differ between regulatory agencies. An *ALARA* recommendation should not be interpreted as a set limit or level.

alpha (α): The specified maximum probability of a *Type I error*. In other words, the maximum probability of rejecting the null hypothesis when it is true. *Alpha* is also referred to as the *size of the test*. *Alpha* reflects the amount of evidence the decision maker would like to see before abandoning the null hypothesis.

alpha particle: A positively charged particle emitted by some radioactive materials undergoing *radioactive decay*.

alternative hypothesis (H_a): See *hypothesis*.

area: A general term referring to any portion of a *site*, up to and including the entire *site*.

area of elevated activity: An *area* over which *residual radioactivity* exceeds a specified value *DCGLEMC*.

area factor (A_m): A factor used to adjust *DCGL_w* to estimate *DCGLEMC* and the *minimum detectable concentration* for scanning surveys in *Class 1* survey units— $DCGLEMC = DCGL_w \cdot A_m$. A_m is the magnitude by which the *residual radioactivity* in a small *area of elevated activity* can exceed the *DCGL_w* while maintaining compliance with the *release criterion*.

arithmetic mean: The average value obtained when the sum of individual values is divided by the number of values.

arithmetic standard deviation: A statistic used to quantify the variability of a set of data. It is calculated in the following manner: 1) subtracting the arithmetic mean from each data value individually, 2) squaring the differences, 3) summing the squares of the differences, 4) dividing the sum of the squared differences by the total number of data values less one, and 5) taking the square root of the quotient. The calculation process produces the Root Mean Square Deviation (RMSD).

assessment: The evaluation process used to measure the performance or effectiveness of a system and its elements. As used in Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), assessment is an all-inclusive term used to denote any of the following: audit, performance evaluation, management systems review, peer review, inspection, or surveillance.

attainment objectives: Objectives that specify the design and scope of the sampling study including the radionuclides to be tested, the cleanup standards to be attained, the measure or parameter to be compared to the cleanup standard, and the *Type I* and *Type II* error rates for the selected statistical tests.

background reference area: See *reference area*.

background radiation: Radiation from cosmic sources, naturally occurring radioactive material, including radon (except as a decay product of source or special nuclear material), and global fallout as it exists in the environment from the testing of nuclear explosive devices or from nuclear accidents like Chernobyl, which contribute to *background radiation* and are not under the control of the cognizant organization. *Background radiation* does not include radiation from source, by-product, or special nuclear materials regulated by the cognizant federal or state agency. Different definitions may exist for this term. The definition provided in regulations or regulatory program being used for a site release should always be used if it differs from the definition provided here.

Becquerel (Bq): The International System (SI) unit of activity equal to one nuclear transformation (disintegration) per second. $1 \text{ Bq} = 2.7 \times 10^{-11} \text{ Curies (Ci)} = 27.03 \text{ picocuries (pCi)}$.

beta (β): The probability of a *Type II error*, i.e., the probability of accepting the null hypothesis when it is false. The complement of *beta* ($1 - \beta$) is referred to as the *power* of the test.

beta particle: An electron emitted from the nucleus during *radioactive decay*.

bias: The systematic or persistent distortion of a measurement process which causes errors in one direction (*i.e.*, the expected sample measurement is different from the sample's true value).

biased sample or measurement: See *judgment measurement*.

calibration: Comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

CDE (committed dose equivalent): The *dose equivalent* calculated to be received by a tissue or organ over a 50-year period after the intake into the body. It does not include contributions from radiation sources external to the body. CDE is expressed in units of *Sv* or *rem*.

CEDE (committed effective dose equivalent): The sum of the committed *dose equivalent* to various tissues in the body, each multiplied by the appropriate weighting factor (w_t). CEDE is expressed in units of *Sv* or *rem*. See *TEDE*.

chain-of-custody: An unbroken trail of accountability that ensures the physical security of samples, data, and records.

Class 1 area: An *area* that is projected to require a *Class 1 survey*.

Class 1 survey: A type of final status survey that applies to *areas* with the highest potential for contamination, and meets the following criteria: (1) *impacted*; (2) potential for delivering a dose above the *release criterion*; (3) potential for small *areas of elevated activity*; and (4) insufficient evidence to support reclassification as *Class 2* or *Class 3*.

Class 2 area: An *area* that is projected to require a *Class 2 Final Status Survey*.

Class 2 survey: A type of Final Status Survey that applies to *areas* that meet the following criteria: (1) *impacted*; (2) low potential for delivering a dose above the *release criterion*; and (3) little or no potential for small *areas of elevated activity*.

Class 3 area: An *area* that is projected to require a *Class 3 survey*.

Class 3 survey: A type of Final Status Survey that applies to *areas* that meet the following criteria: (1) *impacted*; (2) little or no potential for delivering a dose above the *release criterion*; and (3) little or no potential for small *areas of elevated activity*.

classification: The act or result of separating *areas* or *survey units* into one of three designated classes: *Class 1 area*, *Class 2 area*, or *Class 3 area*.

cleanup: Actions taken to deal with a release or threatened release of hazardous substances that could affect public health or the environment. The term is often used broadly to describe various Superfund response actions or phases of remedial responses, such as Remedial Investigation/Feasibility Study. Cleanup is sometimes used interchangeably with the terms *remedial action*, response action, or *corrective action*.

cleanup standard: A numerical limit set by a regulatory agency as a requirement for releasing a site after *cleanup*. See *release criterion*.

coefficient of variation: A unitless measure that allows the comparison of dispersion across several sets of data. It is often used in environmental applications because variability (expressed as a standard deviation) is often proportional to the mean. See *relative standard deviation*.

comparability: A measure of the confidence with which one data set can be compared to another.

completeness: A measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

composite sample: A sample formed by collecting several samples and combining them (or selected portions of them) into a new sample which is then thoroughly mixed.

conceptual site model: A description of a site and its environs and presentation of hypotheses regarding the contaminants present, their routes of migration, and their potential impact on sensitive receptors.

confidence interval: A range of values for which there is a specified probability (e.g., 80%, 90%, 95%) that this set contains the true value of an estimated parameter.

contamination: The presence of *residual radioactivity* in excess of levels that are acceptable for release of a site or facility for *unrestricted* use.

core sample: A soil sample taken by core drilling.

corrective action: An action taken to eliminate the causes of an existing nonconformance, deficiency, or other undesirable situation in order to prevent recurrence.

critical group: The group of individuals reasonably expected to receive the greatest exposure to *residual radioactivity* for any applicable set of circumstances.

critical level (L_c): A fixed value of the *test statistic* corresponding to a given probability level, as determined from the sampling distribution of the *test statistic*. L_c is the level at which there is a statistical probability (with a predetermined confidence) of correctly identifying a background value as “greater than background.”

critical value: The value of a statistic (t) corresponding to a given significance level as determined from its sampling distribution; e.g., if $\Pr(t > t_0) = 0.05$, t_0 is the critical value of t at the 5 percent level.

curie (Ci): The customary unit of radioactivity. One *curie* (Ci) is equal to 37 billion disintegrations per second (3.7×10^{10} dps = 3.7×10^{10} Bq), which is approximately equal to the decay rate of one gram of ^{226}Ra . Fractions of a *curie*, e.g. picocurie (pCi) or 10^{-12} Ci and microcurie (μCi) or 10^{-6} Ci, are levels typically encountered in decommissioning.

D: The true, but unknown, value of the difference between the mean concentration of *residual radioactivity* in the *survey unit* and the *reference area*.

DQA (Data Quality Assessment): The scientific and statistical evaluation of data to determine if the data are of the right type, quality, and quantity to support their intended use.

DQOs (Data Quality Objectives): Qualitative and quantitative statements derived from the DQO process that clarify technical and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

Data Quality Objectives Process: A systematic strategic planning tool based on the scientific method that identifies and defines the type, quality, and quantity of data needed to satisfy a specified use. DQOs are the qualitative and quantitative outputs from the DQO process.

data quality indicators: Measurable attributes of the attainment of the necessary quality for a particular decision. *Data quality indicators* include *precision*, *bias*, *completeness*, *representativeness*, *reproducibility*, *comparability*, and statistical confidence.

data usability: The process of ensuring or determining whether the quality of the data produced meets the intended use of the data.

DCGL (derived concentration guideline level): A derived, radionuclide-specific activity concentration within a *survey unit* corresponding to the *release criterion*. The *DCGL* is based on the spatial distribution of the contaminant and hence is derived differently for the *nonparametric*

test (DCGL_w) and the *Elevated Measurement Comparison* (DCGL_{EMC}). DCGLs are derived from activity/dose relationships through various *exposure pathway* scenarios.

decay: See *radioactive decay*.

decontamination: The removal of radiological contaminants from, or their neutralization on, a person, object or area to within levels established by governing regulatory agencies. *Decontamination* is sometimes used interchangeably with *remediation*, *remedial action*, and *cleanup*.

delta (Δ): The amount that the distribution of measurements for a *survey unit* is shifted to the right of the distribution of measurements of the *reference area*.

delta (Δ): The width of the *gray region* divided by the *arithmetic standard deviation* of the measurements is the *relative shift* expressed in multiples of standard deviations. See *relative shift*, *gray region*.

derived concentration guideline level: See *DCGL*.

design specification process: The process of determining the sampling and analysis procedures that are needed to demonstrate that the attainment objectives are achieved.

detection limit: The net response level that can be expected to be seen with a detector with a fixed level of certainty.

detection sensitivity: The minimum level of ability to identify the presence of radiation or *radioactivity*.

direct measurement: *Radioactivity* measurement obtained by placing the detector near the surface or media being surveyed. An indication of the resulting *radioactivity* level is read out directly.

dose commitment: The dose that an organ or tissue would receive during a specified period of time (*e.g.*, 50 or 70 years) as a result of intake (as by ingestion or inhalation) of one or more *radionuclides* from a given release.

dose equivalent (dose): A quantity that expresses all radiations on a common scale for calculating the effective absorbed dose. This quantity is the product of absorbed dose (rads) multiplied by a quality factor and any other modifying factors. Dose is measured in *Sv* or *rem*.

effective probe area: The *physical probe area* corrected for the amount of the probe area covered by a protective screen.

elevated area: See *area of elevated activity*.

elevated measurement: A measurement that exceeds a specified value $DCGLEMC$.

Elevated Measurement Comparison (EMC): This comparison is used in conjunction with the *Wilcoxon Rank Sum test* to determine if there are any measurements that exceed a specified value $DCGLEMC$.

exposure pathway: The route by which *radioactivity* travels through the environment to eventually cause radiation exposure to a person or group.

exposure rate: The amount of ionization produced per unit time in air by X-rays or gamma rays. The unit of exposure rate is roentgens/hour (R/h); for decommissioning activities the typical units are microroentgens per hour ($\mu R/h$), *i.e.*, 10^{-6} R/h.

external radiation: Radiation from a source outside the body.

false negative decision error: The error that occurs when the null hypothesis (H_0) is not rejected when it is false. For example, the false negative decision error occurs when the decision maker concludes that the waste is hazardous when it truly is not hazardous. A statistician usually refers to a false negative error as a *Type II decision error*. The measure of the size of this error is called *beta*, and is also known as the complement of the power of a hypothesis test.

false positive decision error: A false positive decision error occurs when the null hypothesis (H_0) is rejected when it is true. Consider an example where the decision maker presumes that a certain waste is hazardous (*i.e.*, the null hypothesis or baseline condition is “the waste is hazardous”). If the decision maker concludes that there is insufficient evidence to classify the waste as hazardous when it truly is hazardous, the decision maker would make a false positive decision error. A statistician usually refers to the false positive error as a *Type I decision error*. The measure of the size of this error is called *alpha*, the level of significance, or the size of the critical region.

Field Sampling Plan: As defined for Superfund in the Code of Federal Regulations 40 CFR 300.430, a document which describes the number, type, and location of *samples* and the type of analyses to be performed. It is part of the *Sampling and Analysis Plan*.

fluence rate: A fundamental parameter for assessing the level of radiation at a measurement site. In the case of in situ spectrometric measurements, a calibrated detector provides a measure of the

fluence rate of primary photons at specific energies that are characteristic of a particular radionuclide.

gamma (γ) radiation: Penetrating high-energy, short-wavelength electromagnetic radiation (similar to X-rays) emitted during *radioactive decay*. Gamma rays are very penetrating and require dense materials (such as lead or steel) for shielding.

graded approach: The process of basing the level of application of managerial controls applied to an item or work according to the intended use of the results and the degree of confidence needed in the quality of the results. See *data quality objectives process*.

gray region: A range of values of the parameter of interest for a *survey unit* where the consequences of making a decision error are relatively minor. The upper bound of the gray region in MARSSIM is set equal to the *DCGL_w*, and the *lower bound of the gray region (LBGR)* is a site-specific variable.

grid: A network of parallel horizontal and vertical lines forming squares on a map that may be overlaid on a property parcel for the purpose of identification of exact locations. See *reference coordinate system*.

grid block: A square defined by two adjacent vertical and two adjacent horizontal reference grid lines.

half-life ($t_{1/2}$): The time required for one-half of the atoms of a particular radionuclide present to disintegrate.

Historical Site Assessment (HSA): A detailed investigation to collect existing information, primarily historical, on a *site* and its surroundings.

hot measurement: See *elevated measurement*.

hot spot: See *area of elevated activity*.

hypothesis: An assumption about a property or characteristic of a set of data under study. The goal of statistical inference is to decide which of two complementary hypotheses is likely to be true. The null hypothesis (H_0) describes what is assumed to be the true state of nature and the alternative hypothesis (H_a) describes the opposite situation.

impacted area: Any *area* that is not *classified* as *non-impacted*. *Areas* with a reasonable possibility of containing *residual radioactivity* in excess of natural background or fallout levels.

indistinguishable from background: The term *indistinguishable from background* means that the detectable concentration distribution of a *radionuclide* is not statistically different from the background concentration distribution of that *radionuclide* in the vicinity of the site or, in the case of structures, in similar materials using adequate measurement technology, survey, and statistical techniques.

investigation level: A derived media-specific, *radionuclide*-specific concentration or activity level of *radioactivity* that: 1) is based on the release criterion, and 2) triggers a response, such as further investigation or cleanup, if exceeded. See *action level*.

judgment measurement: Measurements performed at locations selected using professional judgment based on unusual appearance, location relative to known contaminated areas, high potential for *residual radioactivity*, general supplemental information, etc. Judgment measurements are not included in the statistical evaluation of the survey unit data because they violate the assumption of randomly selected, independent measurements. Instead, judgment measurements are individually compared to the *DCGL_w*.

less-than data: Measurements that are less than the *minimum detectable concentration*.

lower bound of the gray region (LBGR): The minimum value of the *gray region*. The width of the *gray region* (*DCGL-LBGR*) is also referred to as the shift.

lower limit of detection (LD): The smallest amount of radiation or *radioactivity* that statistically yields a net result above the method background. The *critical detection level*, *LC*, is the lower bound of the 95% detection interval defined for *LD* and is the level at which there is a 5% chance of calling a background value “greater than background.” This value should be used when actually counting samples or making direct radiation measurements. Any response above this level should be considered above background; i.e., a net positive result. This will ensure 95% detection capability for *LD*. A 95% confidence interval should be calculated for all responses greater than *LC*.

measurement: For the purpose of MARSSIM, it is used interchangeably to mean: 1) the act of using a detector to determine the level or quantity of *radioactivity* on a surface or in a sample of material removed from a media being evaluated, or 2) the quantity obtained by the act of measuring.

minimum detectable concentration (MDC): The *minimum detectable concentration* (MDC) is the a priori activity level that a specific instrument and technique can be expected to detect 95% of the time. When stating the detection capability of an instrument, this value should be used.

The *MDC* is the detection limit, LD , multiplied by an appropriate conversion factor to give units of activity.

minimum detectable count rate (MDCR): The *minimum detectable count rate* (MDCR) is the a priori count rate that a specific instrument and technique can be expected to detect.

non-impacted area: *Areas* where there is no reasonable possibility (extremely low probability) of residual contamination. Non-impacted areas are typically located off-site and may be used as background *reference areas*.

nonparametric test: A test based on relatively few assumptions about the exact form of the underlying probability distributions of the measurements. As a consequence, nonparametric tests are generally valid for a fairly broad class of distributions. The *Wilcoxon Rank Sum test* and the *Sign test* are examples of *nonparametric tests*.

physical probe area: The physical surface area assessed by a detector. The *physical probe area* is used to make probe area corrections in the activity calculations.

power (1-): The probability of rejecting the null hypothesis when it is false. The *power* is equal to one minus the *Type II decision error*, i.e., (1-).

precision: A measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, expressed generally in terms of the standard deviation.

professional judgment: An expression of opinion, based on technical knowledge and professional experience, assumptions, algorithms, and definitions, as stated by an expert in response to technical problems.

qualified data: Any data that have been modified or adjusted as part of statistical or mathematical evaluation, data *validation*, or data *verification* operations.

quality: The totality of features and characteristics of a product or service that bear on its ability to meet the stated or implied needs and expectations of the user.

quality assurance (QA): An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the customer.

Quality Assurance Project Plan (QAPP): A formal document describing in comprehensive detail the necessary *QA*, *QC*, and other technical activities that must be implemented to ensure that the results of the work performed will satisfy the stated performance criteria.

quality control (QC): The overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer, operational techniques and activities that are used to fulfill requirements for quality.

radiation survey: Measurements of radiation levels associated with a *site* together with appropriate documentation and data evaluation.

radioactive decay: The spontaneous transformation of an unstable atom into one or more different nuclides accompanied by either the emission of energy and/or particles from the nucleus, nuclear capture or ejection of orbital electrons, or fission. Unstable atoms decay into a more stable state, eventually reaching a form that does not decay further or has a very long *half-life*.

radioactivity: The mean number of nuclear transformations occurring in a given quantity of radioactive material per unit time. The International System (SI) unit of *radioactivity* is the *Becquerel (Bq)*. The customary unit is the *Curie (Ci)*.

radiological survey: Measurements of radiation levels and *radioactivity* associated with a *site* together with appropriate documentation and data evaluation.

radioluminescence: Light produced by the absorption of energy from ionizing radiation.

radionuclide: An unstable nuclide that undergoes *radioactive decay*.

random error: The deviation of an observed value from the true value is called the error of observation. If the error of observation behaves like a random variable (*i.e.*, its value occurs as though chosen at random from a probability distribution of such errors) it is called a *random error*. See *systematic error*.

readily removable: A qualitative statement of the extent to which a *radionuclide* can be removed from a surface or medium using non-destructive, common, housekeeping techniques (*e.g.*, washing with moderate amounts of detergent and water) that do not generate large volumes of *radioactive* waste requiring subsequent disposal or produce chemical wastes that are expected to adversely affect public health or the environment.

reference area: Geographical *area* from which representative reference measurements are performed for comparison with measurements performed in specific *survey units* at *remediation* site. A site radiological *reference area* (background area) is defined as an area that has similar physical, chemical, radiological, and biological characteristics as the site area being remediated, but which has not been contaminated by *site* activities. The distribution and concentration of *background radiation* in the *reference area* should be the same as that which would be expected on the *site* if that *site* had never been contaminated. More than one *reference area* may be necessary for valid comparisons if a *site* exhibits considerable physical, chemical, radiological or biological variability.

reference coordinate system: A *grid* of intersecting lines referenced to a fixed site location or benchmark.

reference region: The geographical region from which *reference areas* will be selected for comparison with *survey units*.

relative shift (δ): delta divided by the standard deviation of the measurements. See *delta*.

relative standard deviation: See *coefficient of variation*.

release criterion: A regulatory limit expressed in terms of dose or risk.

rem (radiation equivalent man): The conventional unit of *dose equivalent*. The corresponding International System (SI) unit is the *Sievert (Sv)*: 1 Sv = 100 *rem*.

remedial action: Those actions that are consistent with a permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment.

remediation: Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a Superfund site.

remediation control survey: A type of survey that includes monitoring the progress of *remedial action* by real-time measurement of areas being decontaminated to determine whether or not efforts are effective and to guide further *decontamination* activities.

removable activity: Surface activity that is *readily removable* by wiping the surface with moderate pressure and can be assessed with standard radiation detectors. It is usually expressed in units of $\text{dpm}/100 \text{ cm}^2$.

representative measurement: A measurement that is selected using a procedure in such a way that it, in combination with other representative measurements, will give an accurate representation of the phenomenon being studied.

representativeness: A measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

residual radioactivity: *Radioactivity* in structures, materials, soils, groundwater, and other media at a *site* resulting from activities under the cognizant organization's control. This includes *radioactivity* from all sources used by the cognizant organization, but excludes background *radioactivity* as specified by the applicable regulation or standard. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the *site*, even if those burials were made in accordance with the provisions of 10 CFR Part 20.

sample: a part or selection from a medium located in a *survey unit* or *reference area* that represents the quality or quantity of a given parameter or nature of the whole area or unit; a portion serving as a specimen.

sample: a set of individual samples or measurements drawn from a population whose properties are studied to gain information about the entire population.

Sampling and Analysis Plan (SAP): As defined for Superfund in the 40 CFR 300.430, a plan that provides a process for obtaining data of sufficient quality and quantity to satisfy data needs. The sampling and analysis plan consists of two parts: 1) the *Field Sampling Plan*, which describes the number, type, and location of samples and the type of analyses; and 2) the *Quality Assurance Project Plan*, which describes policy, organization, functional activities, the *Data Quality Objectives*, and measures necessary to achieve adequate data for use in selecting the appropriate remedy.

scanning: An evaluation technique performed by moving a detection device over a surface at a specified speed and distance above the surface to detect radiation.

shift: See *delta* (Δ).

Sievert (Sv): The special name for the International System (SI) unit of *dose equivalent*. 1 Sv = 100 *rem* = 1 Joule per kilogram.

Sign test: A *nonparametric* statistical test used to demonstrate compliance with the release criterion when the radionuclide of interest is not present in background and the distribution of data is not symmetric. See also *Wilcoxon Rank Sum test*.

site: Any installation, facility, or discrete, physically separate parcel of land, or any building or structure or portion thereof, that is being considered for survey and investigation.

soil activity (soil concentration): The level of *radioactivity* present in soil and expressed in units of activity per soil mass (typically Bq/kg or pCi/g).

split: A sample that has been homogenized and divided into two or more aliquots for subsequent analysis.

standard normal distribution: A normal (Gaussian) distribution with mean zero and variance one.

standard operating procedure (SOP): A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and that is officially approved as the method for performing certain routine or repetitive tasks.

subsurface soil sample: A soil sample that reflects the modeling assumptions used to develop the *DCGL* for subsurface soil activity. An example would be soil taken deeper than 15 cm below the soil surface to support *surveys* performed to demonstrate compliance with 40 CFR 192.

surface contamination: *Residual radioactivity* found on building or equipment surfaces and expressed in units of activity per surface area (Bq/m² or dpm/100 cm²).

surface soil sample: A soil sample that reflects the modeling assumptions used to develop the *DCGL* for surface soil activity. An example would be soil taken from the first 15 cm of surface soil to support *surveys* performed to demonstrate compliance with 40 CFR 192.

survey: A systematic evaluation and documentation of radiological measurements with a correctly calibrated instrument or instruments that meet the sensitivity required by the objective of the evaluation.

survey plan: A plan for determining the radiological characteristics of a *site*.

survey unit: A geographical *area* consisting of structures or land areas of specified size and shape at a remediated site for which a separate decision will be made whether the unit attains the site-specific reference-based cleanup standard for the designated pollution parameter. *Survey units* are generally formed by grouping contiguous site areas with a similar use history and the

same classification of contamination potential. *Survey units* are established to facilitate the survey process and the statistical analysis of survey data.

systematic error: An error of observation based on system faults which are biased in one or more ways, *e.g.*, tending to be on one side of the true value more than the other.

T+: The *test statistic* for the *Wilcoxon Signed Rank test*.

TEDE (total effective dose equivalent): The sum of the effective *dose equivalent* (for external exposure) and the committed effective *dose equivalent* (for internal exposure). *TEDE* is expressed in units of *Sv* or *rem*. See *CEDE*.

test statistic: A function of the measurements (or their ranks) that has a known distribution if the null hypothesis is true. This is compared to the *critical level* to determine if the null hypothesis should be accepted or rejected. See *S+*, *T+*, and *w_r*.

triangular sampling grid: A grid of sampling locations that is arranged in a triangular pattern. See *grid*.

Type I decision error: A decision error that occurs when the null hypothesis is rejected when it is true. The probability of making a *Type I decision error* is called *alpha* (α).

Type II decision error: A decision error that occurs when the null hypothesis is accepted when it is false. The probability of making a *Type II decision error* is called *beta* (β).

unrestricted area: Any *area* where access is not controlled by a licensee for purposes of protection of individuals from exposure to radiation and radioactive materials—including areas used for residential purposes.

unrestricted release: Release of a *site* from regulatory control without requirements for future radiological restrictions. Also known as unrestricted use.

validation: Confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. In design and development, validation concerns the process of examining a product or result to determine conformance to user needs.

verification: Confirmation by examination and provision of objective evidence that the specified requirements have been fulfilled. In design and development, verification concerns the process of examining a result of given activity to determine conformance to the stated requirements for that activity.

w_r : The sum of the ranks of the adjusted measurements from the reference area, used as the *test statistic* for the *Wilcoxon Rank Sum test*.

w_s : The sum of the ranks of the measurements from the survey unit, used with the *Wilcoxon Rank Sum test*.

Wilcoxon Rank Sum (WRS) test: A *nonparametric* statistical test used to determine compliance with the *release criterion* when the *radionuclide* of concern is present in background. See also *Sign test*.